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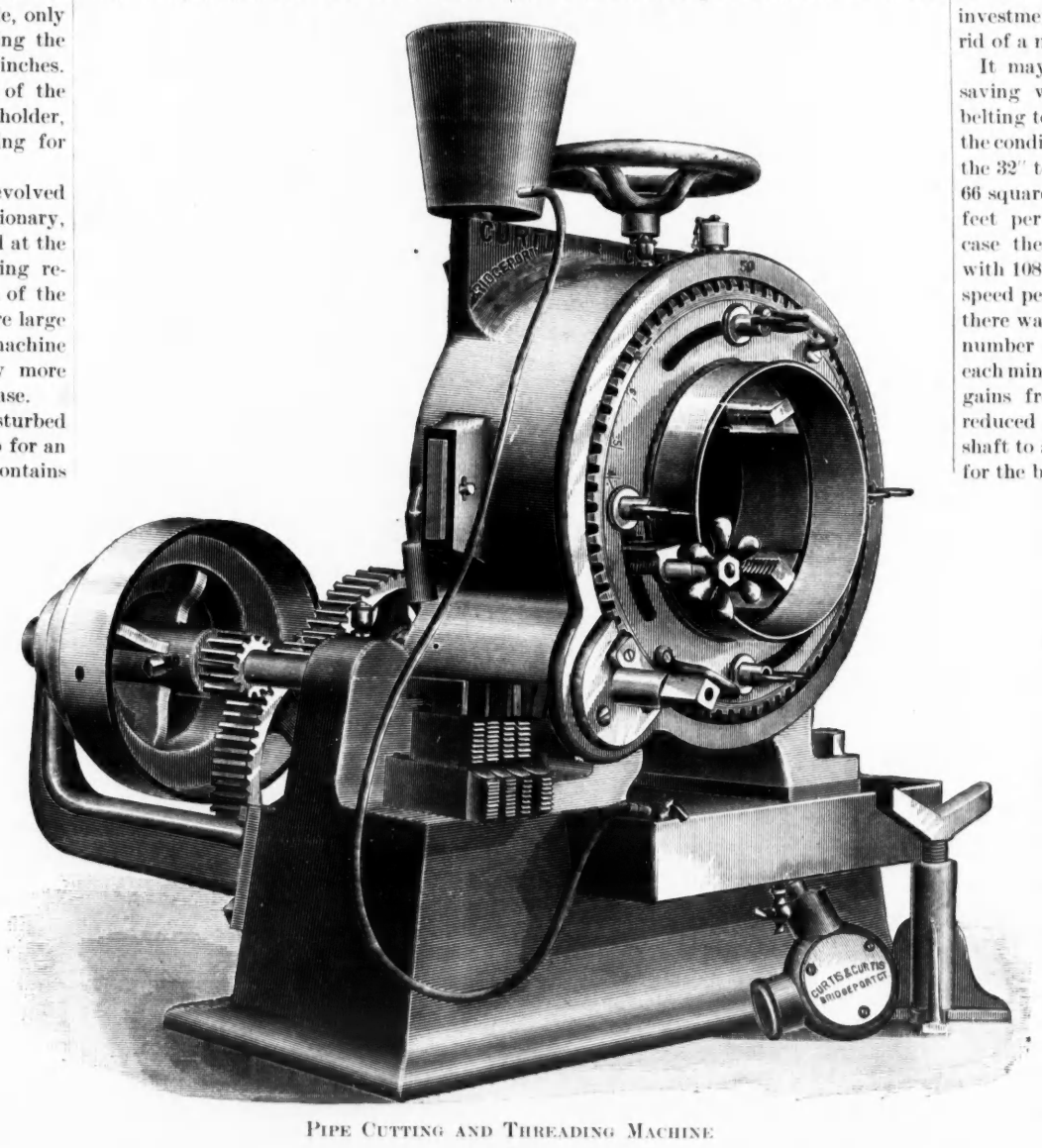
Pipe Cutting and Threading Machine.

We give on this page an illustration of a new pipe cutting and threading machine, which is so arranged that it may be driven by power when it is to be used in the shop, or, when large jobs are to be done outside, it can be worked by hand power, and is so geared that pipes up to 8 inches diameter are easily cut or threaded. In this machine all dies are made to open when the thread is finished, thus saving the loss of time and wear resulting from running back over the threads. The dies are also adjustable, only three sets of dies being used for cutting the full range of pipe from 2½ inches to 8 inches. The adjustment is effected by means of the cam slots seen in the front of the die holder, graduations showing the proper setting for the given sized pipe.

In this machine the pipe is not revolved while it is being cut, but remains stationary, held by the universal chuck provided at the back and the rests, the die holder being revolved around the pipe by the motion of the machine; an arrangement which, where large pipes are to be handled, enables the machine to be made lighter and considerably more simple than would otherwise be the case.

The base of the machine is not disturbed when it is to be taken out of the shop for an outside job, but the frame which contains all the working parts is removed from the base by taking out the bolts which hold it in position, and when this is removed all the parts that are used in working the machine by hand come off with it, leaving the cone pulley with its belt, etc., in position. There is a lead screw which draws the die onto the pipe at the proper rate, causing it to recede into the case as the cutting proceeds.

The machine is made by Curtis & Curtis, Bridgeport, Conn.



PIPE CUTTING AND THREADING MACHINE.

On the Transmission of Power.

BY PETER H. BULLOCK.

In a former article, regarding the horse-power of engines, I told of the mistake made by a friend who bought an engine, supposing it to be a certain horse-power, because another engine of the same size of cylinder had been warranted to him to produce the required power. In this case the size of the cylinders was the only resemblance the engines bore to each other, for one was a high-speed, adjustable cut-off engine, with a piston valve, while the other was a poorly-made D-valve engine, with throttling governor, and adjusted to run at a very moderate speed.

In a similar way I will mention a contract that was very unsatisfactory to my employers, and that was entered into from combining two statements made by myself at different times, each of which was substantially correct for the different conditions and surroundings as they existed when the statements were made, but when combined under different conditions, and applied in actual practice, they proved very satisfactory — to the other party of the contract.

Previous to telling the story a word about belts and the best way of transmitting power by them. Perhaps I can best make the ideas plain by describing some improvements made in a manufacturing establishment not long since. It is also interesting to notice that the saving in this case was about the same per cent. as I found the loss to be in my experiments a few months ago with too tight belts, as in this case the belts had to be too tight in order to do the required work, and the saving was effected by re-designing the transmitting apparatus.

There were four somewhat complicated machines that, so far as I need to describe them, consisted each of a central shaft on which there were three driving pulleys of different sizes, so as to produce the proper relative speed to different parts of the machine when the shaft was run at the speed it was designed to run—in this case 500 revolutions. Each of these pulleys drove parts of the machine that required considerable power, and had endless belts 4″ wide. The ends of these driving shafts projected about 18″ outside of the machines, and were supported by bearings on the end of a curved arm, leaving a space of 12¼ inches, or just enough for 6″ tight and loose pulleys. In the room where these machines were set up there was a main line of shafting running 125 revolutions per minute and attached to continuous stringers with hangers of 16″ drop. This made it impossible to put on larger than 32-inch driving pulleys without cutting the stringers, so that size was adopted, and with the already established speed of the main shaft there was but one size for tight and loose pulley that could be used to get the right speed, namely, 8″. The machines were all set side by side, with the belts all pulling in the same direction. Some of the driving pulleys were midway between hangers, and all the belts were open, and of course considerably less than half of the pulley surface was in contact with them. Indicator diagrams taken from the engine showed that about 52 horse-power was used in running these machines as above described. This was considerably more than was figured by the builders as being necessary, and a man who was supposed to know something about such things was called in to see where the trouble was. After looking matters over a while he said: "You are getting up your speed too quick; there is not belt surface enough at the point where you first deliver the power." He recommended that two countershafts be erected and run at 250 revolutions each by belting from two of the 32″ pulleys on the main shaft to two 16″ on the counters. The recommendation was adopted and the two shafts were erected on opposite sides of the room, so that the two belts that drove them pulled against each other, leaving the main shaft with little or no lateral strain. The driving pulleys on the countershafts were made 24 inches diameter, and tight and loose pulleys 12 inches in diameter were put on the machines in place of the 8-inch. The machines were started up and run without any trouble with belts or bearings. The indicated horse-power was now 41. The cost of these improvements, including a modest fee to the man that was supposed to "know how," was $87. The engine that furnished the power used a little over 4 pounds of coal per horse-power per hour, and the direct saving of fuel was over 400 pounds per day of 10 hours. The saving in the cost of fuel was about $290 per year. Was not this improvement a good business investment, not to mention the fact of getting rid of a mechanical nuisance?

It may seem strange that there was any saving when there was more shafting and belting to run than before. Let us see about the conditions: In the first place, the belt from the 32″ to the 8″ pulley had a belt contact of 66 square inches and run at a speed of 1,047 feet per minute. In the improved latter case the belts run from 24″ to 12″ pulleys with 108 inches in contact, and at the same speed per minute as before. In other words, there was an increase of 63+ per cent. in the number of square inches of belt in contact each minute. These improvements resulted in gains from the following causes: First, it reduced a very excessive strain on the main shaft to almost nothing, and made it possible for the belts to do their work at a proper tension; second, the belts lasted longer and there was no heating up of bearings, even with less oil; third, there was a more regular speed and no more frequent stoppages for repairing belts or cooling heated bearings. I have no doubt that there are numerous places where power is being worse than wasted, for it would be far better to have the fuel stolen at the coal pile than to have the converted energy thrown away at the point where it should be delivered to the producing machines.

Now for that power contract: The writer once had charge of a plant where some rooms were let with power if the tenant so desired. We had a fixed price per horse-power that was satisfactory all around, and it was usual to determine the amount used by taking diagrams from the engine when all the other work was thrown off. We had a superintendent who was quite deficient in mechanical knowledge or ideas, but he was hustling to acquire points on everything that came in his way. He would always ask a question and then go away and note down the answer. In fact, he never came around a corner without stopping to write down something that had just been told him. One day I answered one of his off-hand questions as to how wide a belt to put onto a certain machine that would require about 10 horse-power, by saying that a 6-inch 4-ply rubber belt would be the best for that particular place. Here was one fact for entry in his note book: "A 6″ belt will do 10 h. p. work." Some weeks later he asked my opinion about putting another machine onto a shaft that was driven by a 6″ belt, and my answer was that it would not carry it as then belted, and incidentally remarked that there was already 10 horse-power being taken from

it. Here was another entry for the scrap-book: "A 6" belt won't do over 10 horse-power," and he was the author of this astonishing fact.

He had the letting of the rooms, and had a customer who wanted a large room and who said he could get all the power he wanted from a 6" belt, which our superintendent interpreted according to my fragmentary formula as being 10 horse-power, and made a contract accordingly, the customer to furnish all the pulleys and belts. Our main shaft run 240 and the man wanted about the same speed, so he got a clamp pulley 34x8 and put it onto our shaft and another solid one of the same size for his shaft.

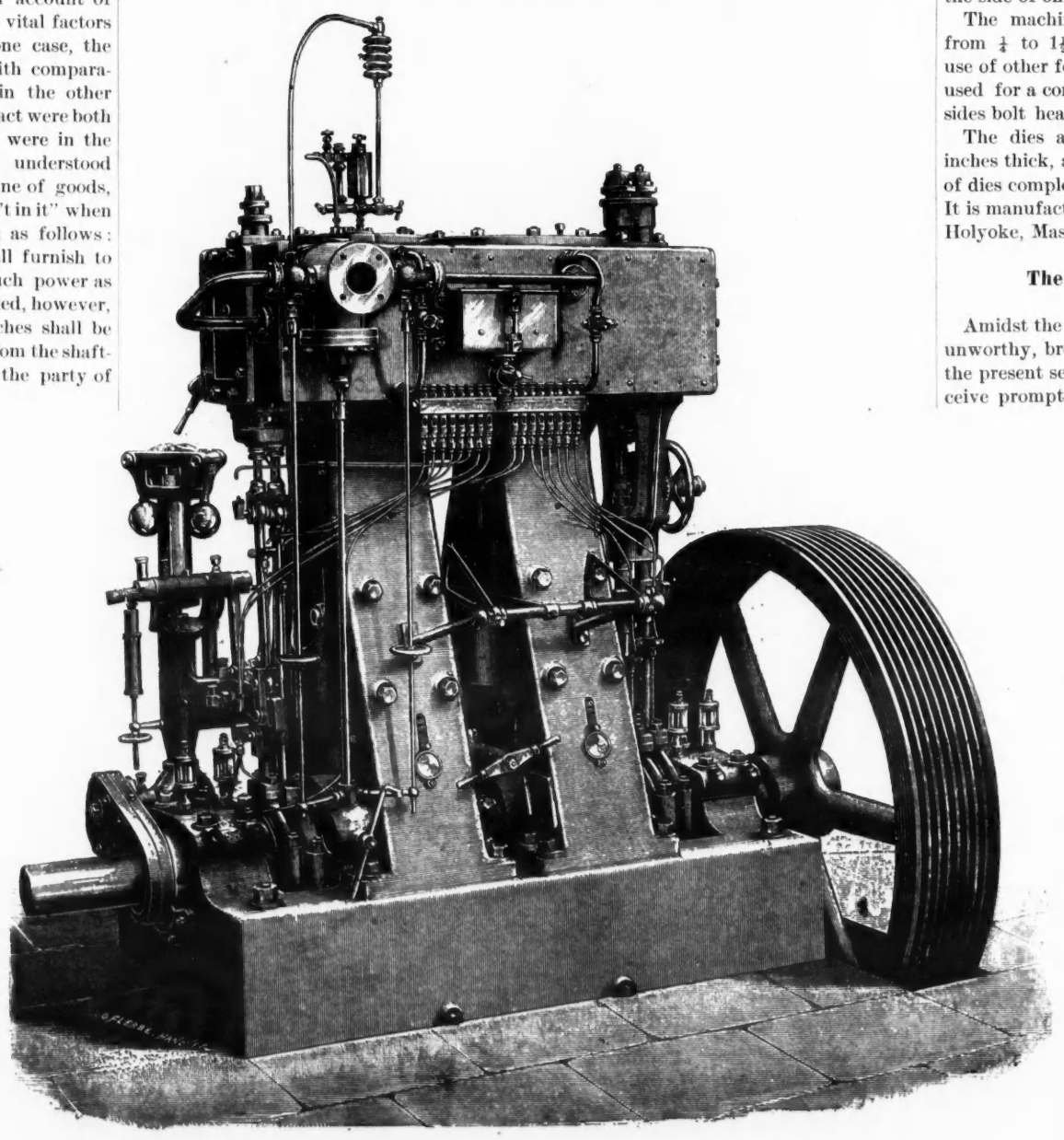
Our customer erected his shaft about twenty feet from ours and put on a nice new double leather belt, and crossed, as he said, to take up less room; but as this economized room was some eleven feet from the floor, I had a remote suspicion that it was to secure more belt surface contact. He was a good mechanic, and he put the pulley on our shaft close to a hanger, and the driver pulley on his shaft between two that were quite close together. He put in his machinery and started up, apparently at peace with all mankind and entirely satisfied with his rent and power contract. In my first monthly report after this there was considerably more than ten horse-power entered for that contract. You may judge of my surprise to find myself quoted as the authority on which the power feature of the contract had been based, and was quite sharply asked if I had not said that a 6" belt in No. 4 shop would not do any more than 10 horse-power, and how it was that I had now reported that another belt of the same width was doing far more in another place. Like my friend who bought the engine, he had only taken account of *sizes*, and had left out the very vital factors of speed and conditions. In one case, the belt run at a moderate speed with comparatively small surface contact; in the other case, the speed and surface contact were both more than double what they were in the former. This superintendent understood the manufacture of a certain line of goods, but, as you have seen, he "wasn't in it" when he signed a contract that run as follows: "The party of the first part shall furnish to the party of the second part, such power as he may need and require, provided, however, that a belt no wider than six inches shall be used in transmitting the same from the shafting of the party of the first to the party of the second part."

It will be seen that the ability of a belt to transmit power depends primarily upon the amount of surface in contact with the pulley in a given time, which matter is generally determined when the machinery is erected, and pertains to the width of the belt and the speed at which it moves. The effectiveness of belts, however, depends upon several other conditions, such as whether they are soft and pliable; the relative sizes of the driving and driven pulleys; whether they are at a proper tension and run in such a direction that their own weight will increase or diminish the surface contact. This loss of contact by running horizontal belts with the tight or working side at the top is often as much as five per cent., and increases with the speed, inasmuch as the inertia of the swiftly moving belt tends to carry it by and away from the proper point of contact with the receiving pulleys. A notable illustration of this is to be seen in link belts, where weight and inertia are prime factors, as any one would find should they attempt to run one of them in the opposite direction.

Briefly stated, to transmit a certain power there will be required a certain number of time inches of contact between the surfaces of a belt and pulley, and it matters not in which way it is got, either by a narrow belt at high speed or by a wide belt at slow speed, provided, of course, that they are within the limits of reasonable practice. In fact, there has been nearly a hundred horse-power transmitted through two stories of salesrooms, inside of 8-inch iron pipes disguised and used as supporting columns. Of course to do this would require careful designing, and ample room above and below for large pulleys, but it shows the possibilities that are at the command of the designing engineer when he has mechanical problems to solve that are complicated by commercial or architectural reasons that confine the space at his disposal to narrow limits.

Compound Electric Light Engines.

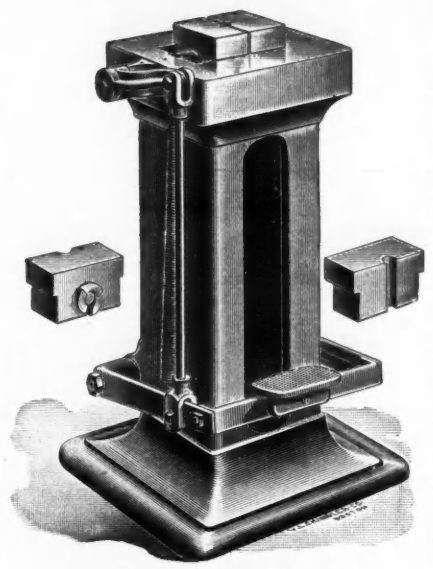
The engine shown below is one of a series specially made for electric light installations, and varying in power from 40 to 200 indicated horse-power. The engine as illustrated has high-pressure cylinder, 11 inches diameter, low-pressure ditto, 18 inches diameter by 12 inch stroke, and makes 200 revolutions per minute, though it can be worked up to 250 revolutions. The crank-shaft is 6 inches diameter, and has three bearings with a total length of 32 inches. All the working parts have very large wearing surfaces, and the engine throughout is of most massive build. Every part being carefully balanced, and the right provision being made in the set of the valves, the engine can be run at the high speed of 250 revolutions per minute with ease and safety, and there is a total absence of vibration or shock. All the working parts are well lubricated from a central oil-box, which is fitted with a gauge showing its contents, and each separate point to be oiled has an independent adjustment with a visible drop-feed.



COMPOUND ELECTRIC LIGHT ENGINE.

The engine is governed automatically by link expansion gear controlled by a powerful Richardson governor, and not more than two per cent. variation in the number of revolutions is made between all load on and the engine running light, while with ordinary changes of load the variation is imperceptible. The governor is driven by gearing direct from the shaft through machine-cut wheels which are enclosed in a casing. The weight of valve rods is compensated by means of steam plungers, so that the whole motion is in complete balance. The governor is also fitted with an extra adjustment, by means of which the speed can be varied while the engine is running, and set at any required number of revolutions. The large ends of the connecting rods are fitted with centrifugal oilers which are continuously supplied with lubricant. The crank and connecting rods being protected by the main standard, any splashing or waste of lubricant is avoided, and all drips are collected in suitable wells in the base plate, from which all the oil can be removed by passages and cocks arranged for the purpose. The lower part of the columns on the front side is arranged to be removed when it is required to examine the crank-pin, or to take out the crank, and this can be quickly and easily done without disturbing any other part of the engine. All the levers and handles are brought conveniently together in front of engine, so that the starting valve, intermediate receiver, drain cocks, and governor adjustment can all be attended to from one position. The engine may be used to drive a dynamo direct, or with belts or ropes.

The engine the particulars of which have been given has been made for the Newcastle-on-Tyne Electric Supply Company, and drives a 37½-unit Mordey Victoria alternator, which develops 70 to 75 horse-power. This company has in its Newcastle station three other coupled compound engines, each of 200 horse-power, and which are used during the evening. The smaller one is used for day lighting, and to work during the day and night in conjunction with one or more of the larger engines.—*London Engineer.*



BLACKSMITHS' BOLT HEADER.

Blacksmiths' Bolt Header.

We give herewith an illustration of a bolt header which seems to have some points of superiority over the usual device of its class.

The base is made sufficiently heavy and broad at the bottom to make it stand firm, and the dies are so made as to clamp the bolt very firmly under the head, and prevent any upsetting there. One of the dies is moved up to the other to effect this clamping by means of the foot treadle, which acts to rotate a short shaft, the end of which is formed to match the cam surfaces seen at the side of one of the detached dies.

The machine is adapted to head bolts from ¼ to 1½ inches diameter, and by the use of other forms of dies can, of course, be used for a considerable variety of work besides bolt heading.

The dies are 6 inches square on top, 2¾ inches thick, and the machine with ten sets of dies complete, weighs about 650 pounds. It is manufactured by C. H. Baush & Sons, Holyoke, Mass.

The Revolving Turret.

Amidst the mass of claims, many of them unworthy, brought before Congress during the present session, is one which should receive prompt attention and be acted upon generously. The bill, introduced by Mr. Belden, of New York, is one for the relief of Theodore R. Timby, and is intended as a recognition, which, though late, is better than never, of the great services done the country by one man during the war of the rebellion. Not only has Mr. Timby, now an old man, never received any compensation for his services to the government, but he has been even robbed of the honor justly due him. The records of the United States Patent Office show Theodore R. Timby, who had previously achieved reputation through the turbine wheel invention, as the sole originator and author of the revolving turret invention, and it was only through his courtesy and patriotism that Ericsson was permitted to use the invention on the Monitor and achieve the success which saved our navy. The vigorous Swede, who deserves all credit for such work as he really did, received also, unjustly, credit for the revolving turret, while Mr. Timby, quiet and retiring, made no claim and had no compensation from the government. Naval officers all know the facts in the case, but naval officers have enough to do in securing justice for themselves, without

attending to the interests of outsiders. The inventor has, since the war, pursued his work in the same line, and, clear-headed as ever, has just perfected a design for a system of coast defenses, the features of which are said to be as novel as they promise to be effective. He needs money to carry out his plans, which are for the good of the country, as was his first great work. In this instance Congress will be wise if it be just and generous.—*Chicago Journal.*

High and Low-water Alarm.

We illustrate herewith a high and low-water alarm for boilers, which, as will be seen, is attached to the ordinary water column, and does not depend upon floats for its action, but upon the expansion and contraction of copper tubes. The engraving gives a view of the apparatus complete as attached to a boiler, and also at the left a detached view (enlarged) of a portion of the tubes and the mechanism. The central tube is merely to support the mechanism, and nothing enters it, steam for blowing the whistle being taken from the pipe seen at the left, connected by the T-joint.

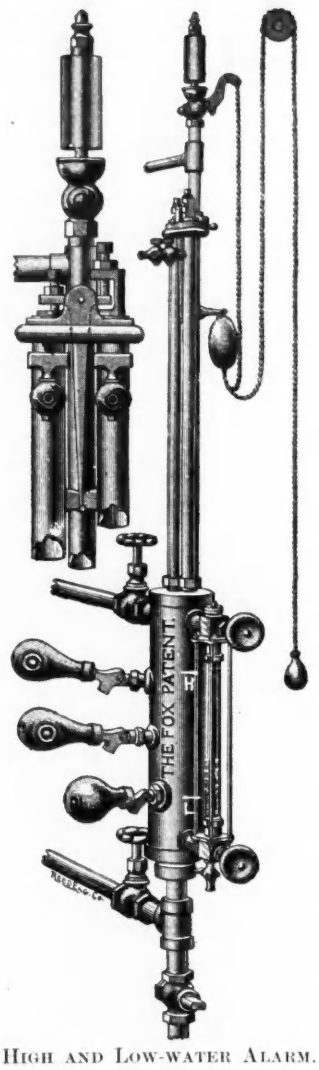
The copper tube at the left is the low-water alarm. It goes down into the column to the low-water line, and, so long as the water is kept above this point, is filled with water to the top, which, owing to lack of circulation, becomes comparatively cold. But should the water fall below the end of this tube, steam enters it, and by its increase of temperature it expands against the end of the adjustable set-screw seen above, moving the lever and allowing the small weight seen at the right to drop off from the lever on which it is suspended, and open the whistle valve, which, of course, it keeps open until some one replaces it.

The tube at the right terminates at the high-water line, and, so long as the water is kept below this point, is filled with steam and kept expanded by the heat. But if the water rises to the lower end of this tube, the steam is thereby cut off, and that which is in the tube condenses by the cooling effect of the atmosphere, the vacuum thus created being filled by water. The set-screw above is so adjusted, however, that before this is completed the contraction of the tube moves the lever in the same way as is done by the expansion of the other tube, and the whistle is opened as before.

The advantage of attaching it to the water column is that it saves one hole in the boiler, and by manipulating the valves either alarm may be made to work, thus showing that it is in working condition. It is made in three sizes by the Fox Machine Co., Grand Rapids, Mich.

A conductor on the Pennsylvania Railroad had his right hand smashed while coupling cars. As a compensation the company is said to have presented him with $5,000 outright, and promised him a clerkship as soon as he can write with his left hand, all of which is very commendable.

The work done by Warner & Swasey, of Cleveland, on the great Lick telescope, is speaking for itself, and the better the astronomers become acquainted with it the better it is appreciated. The Lick telescope is now pronounced by the most competent judges to be not merely the largest refracting telescope ever constructed, but the very best mounted telescope as well. That astronomers appreciate this is shown by the fact that Messrs. Warner & Swasey's astronomical work has come to be a very considerable part of their business, and is still growing. Among the contracts now on hand we note a 45-foot and a 26½-foot dome for the Naval Observatory at Washington and a number of shutters, with accompanying mechanism, for transit houses. Then there is a 12-inch equatorial telescope, with a 26½-foot dome, for Mr. G. E. Hale, of Chicago, and a 16-inch equatorial for Carlton College, Northfield, Minn. In the case of the latter instrument, the astronomer in charge of the observatory, after making a thorough personal investigation of what had been and was being done in telescope mounting, both here and abroad, gave Messrs. Warner & Swasey the order, without restrictions or specifications of any kind, simply asking them to put in what they considered to be the best arrangement, which, of course, is the highest compliment



HIGH AND LOW-WATER ALARM.

he could well pay to their skill and ability. Messrs. Warner & Swasey have worked hard to win their success, and have accomplished much that not only reflects credit upon themselves, but upon American mechanical skill generally.

English or American Steel?

English scissors are still called for by ladies, but tailors and others using scissors in their daily work have long since ceased to look for the Sheffield mark. This is very significant, and the fact that an English tailor insists on American-made shears is a great slur upon us, as the very best article is needed in cutting out garments. Ten years ago English scissors brought double an apparently similar article of American make. Now the most costly shears in these days are of American manufacture, and every year a greater quantity of them are being imported. It is the boast of an American house that they ship shears regularly to Sheffield, and by so doing discount the oft-repeated story and fable about "shipping coals to Newcastle."—*Machinery and the Iron and Steel Trade Review* (London).

A reduction of ten per cent. has been ordered in the pay of the men employed at the Watervliet Arsenal. This will leave the pay of machinists $2.27 per day. There is much dissatisfaction amongst the men, many of whom are leaving.

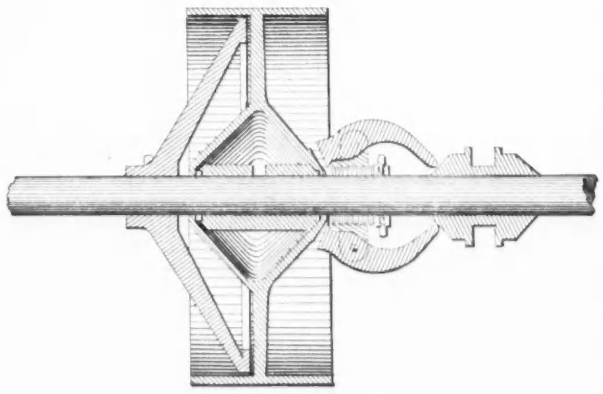
The first sewing machine was patented in England in the year 1700. One of these old machines is on exhibition in England. America, however, can claim the credit of perfecting the sewing machine, and making it a commercial success.

Friction Clutch.

We illustrate herewith a new friction clutch made by the States Machine Company, Newark, N. J.

A conical shaped flange is attached to the shaft in such a way that, when the clutch is thrown in by the lever, the pulley is forced against this flange; the friction surfaces being nearly the diameter of the pulley, with a fiber disk interposed, gives the maximum driving power.

The hub of the pulley is formed as shown, for the purpose of making the pulley self-lubricating, the central reservoir being filled with oil, which is constantly kept flowing over the bearing by a chain which takes it up and keeps it in circulation. This clutch is adapted for use on countershafts, elevators, traction gear, etc., and is made of any desired size.



FRICTION CLUTCH.

Treatment of an Industrial Paper—Use.

BY JARNO.

Once upon a time the owner of a machine shop wanted to form a club to take an industrial or mechanical paper. He requested me to hand in the names of those in his employ who would like to subscribe. As he employs more than four hundred men, three-quarters of whom are possible subscribers, I had an opportunity to hear many answers to the question, "Would you like to subscribe?" and to hear an occasional expression of opinion as to mechanical papers. As they are given by those for whom the papers are written, these opinions are interesting, and they contain the suggestions that are made use of in this paper.

I handed in something more than one hundred names. I wanted to believe that I had done a good thing, and that some of the men had been induced to subscribe because I had asked them; but my philosophical friend, Sam Smith, tells me that I did nothing to feel elated over, and that the only reasons why they gave me their names was because they wanted the paper. He goes on to say:

"Self-esteem is well enough in its place, but it is so likely to overgrow that it should be watched rather than cultivated. In writing, one of the first elements of success is to think of the subject rather than self."

I never part with Sam Smith without thinking differently about some things from what I ever thought before. Along with his wide experience, he has that fine appreciation of wit and pathos which makes him so welcome to all.

Once or twice the question was asked, "Will it pay me to take the paper?" While this is legitimate enough, yet it shows an inclination to be rather too exacting with a mechanical paper. At any rate, being a mechanic, I would, in similar circumstances, treat a mechanical paper as well as I would any other. If I should subscribe for any paper for the sake of instruction or amusement, then I would not allege as a reason for not subscribing for a mechanical paper that it would not pay.

After the paper had been coming to the shop for some weeks I noticed a few copies from which the mailing wrappers had not been removed. This is not quite fair. It does not give the paper even a chance to show what it can do, either to help or instruct. To see papers lying around with their wrappers still on chills one that might otherwise subscribe. And so I would say first, in the treatment, take off the wrapper and give the paper some sort of examination.

I heard of a man that would not subscribe, because, ten years ago, the paper reported a shop conversation in diction that he considers slang rather than shop language, and because it reported an addition to a shop when only a coal shed had been built. I am happy to say that I did not come across such a man. He makes me think of Waubug Mephit, to whom all diction that is not his diction is slang. It is more likely that he did not appreciate the paper than that the paper did not appreciate him. To condemn a paper for mistaking, without writing to it suggesting a correction, is not fair, especially when it invites correspondence.

As to use, it is seldom worth while to save entire copies of any paper; it is usually enough to save only clippings containing articles of special interest, and to keep them in envelopes, as has been spoken of in the AMERICAN MACHINIST, though a scrap-book is sometimes preferred. One may mistake in saving a large file of papers, or, in fact, in collecting quantities of any kind of reading matter, with the idea that all will be read some time. That some time seldom comes. Let any one count up the leisure hours which one has felt free to give to reading, during the last month, or the last year even, and, after making due allowance for what can be read in an hour, see how much is likely to be read in the next year. One will then, no doubt, decide that it is utterly useless to save a file of papers with the idea that they will ever be read. We can take our disposable time only out of the eternal now. I found a few of the men that had a file of papers that the folks at home said was in the way, which was given as a reason for not subscribing any longer. This amounts to refusing to subscribe again, which is neither quite fair nor very useful.

Some of the advantages of having clippings in envelopes are, that clippings on any subject, being in one envelope, can be referred to or carried in the pocket without handling a regular scrap-book, and the envelopes can be added to or the clippings rearranged at any time.

An acquaintance tells me of a curious custom of a well-known author who had many books, to each of which he frequently referred. Upon reading a new book, he took out every leaf that did not pertain to the line of thought he was pursuing. This he did to save time. His books had a shrunken look, but they were just right for his purpose, as he used them merely as tools. When he took one from his library he was certain that it contained only such matter as he might want.

When I tear off the mailing wrapper of my paper, I feel that I am introduced into a company of writers who are at their best. I may not be specially interested in all they say, though the opinions of others in the same calling, the latest improvements, and the condition of trade are always matters of interest. The sayings of these writers I do not take as theories, but as the conversation of workmen on their way to the shop, or during the noon hour. If a writing is so clear that it can be understood upon the first reading, it may be so, not because the subject is easy to write about, but because the writer has worked hard to make it clear.

The Railroad and Engineering Journal has published in pamphlet form a lecture delivered before the students of Sibley College, Cornell University, by O. Chanute, C. E., of Chicago, on Aerial Navigation. The address is a review of what has been attempted and what has been accomplished heretofore, and an explanation of the difficulties yet to be overcome. The principles involved in the matter are discussed quite fully, and illustrations are plentiful. The pamphlet is interesting, and to those who have occasion for investigation of the subject, valuable.

A Hand-power Traveling Crane.

In our issue of November 27, '90, we published, as part of our report of the Richmond meeting of the American Society of Mechanical Engineers, some account of a five-ton traveling crane to be worked by hand, constructed by Professor John E. Sweet for use in the new shops of the Straight Line Engine Company at Syracuse. These shops were illustrated and described in our issue of September 4, '90, and we now present engravings made from working drawings of the crane.

The available space for this crane between bottom of roof trusses and top rails was five feet six inches, and in this space was placed a bridge five feet deep, and a trolley having wheels four feet diameter; the total weight of bridge and trolley (fifteen feet span) being about two tons. The girders are latticed as shown by Figs. 1 and 2, which give plan and side elevation respectively, Figs. 3 and 4 being end views, the latter showing the trolley in position between the girders, which are connected over the top also as shown in Fig. 1, to give lateral strength and rigidity, which is further increased at the bottom by the light truss rods shown at either side of the bridge in the plan, Fig. 1.

The bridge is supported upon four wheels, each four feet diameter, having conical treads and outside flanges, the axles of the wheels being supported at a distance from the sides of the bridge by the brackets shown, which are composed of T-bars. Two of these wheels (one at each end of the bridge) are provided with internal gears, and

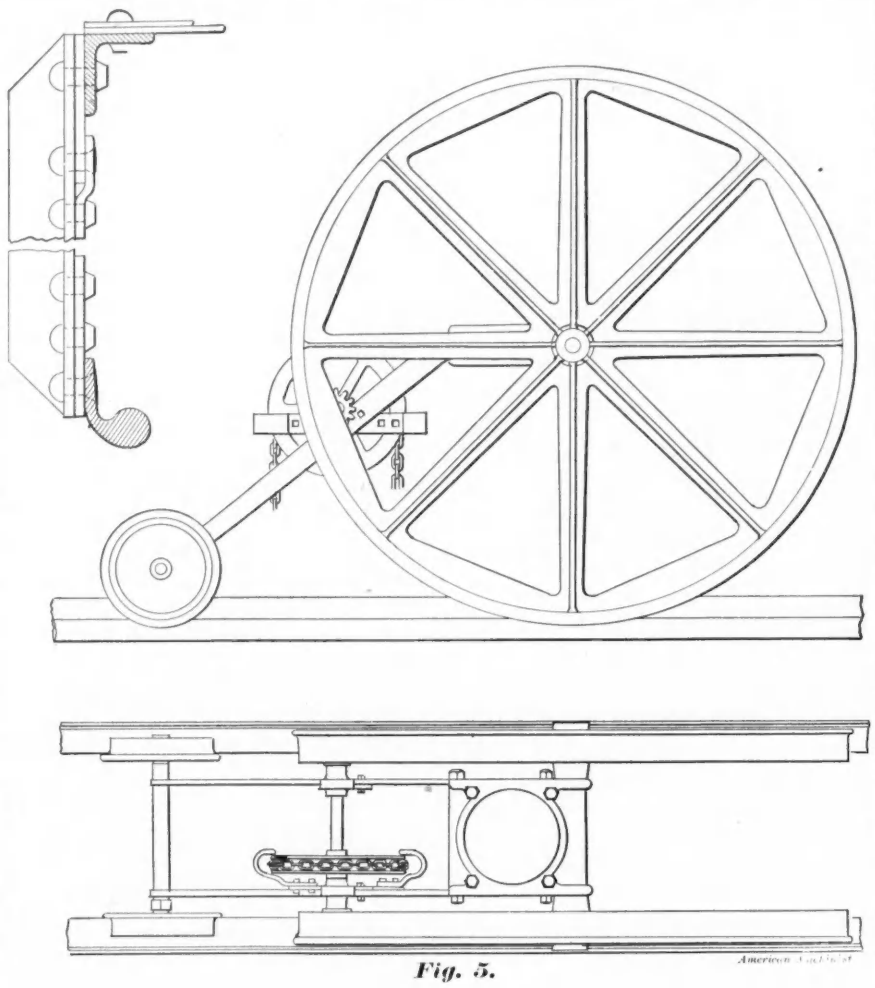


Fig. 5.

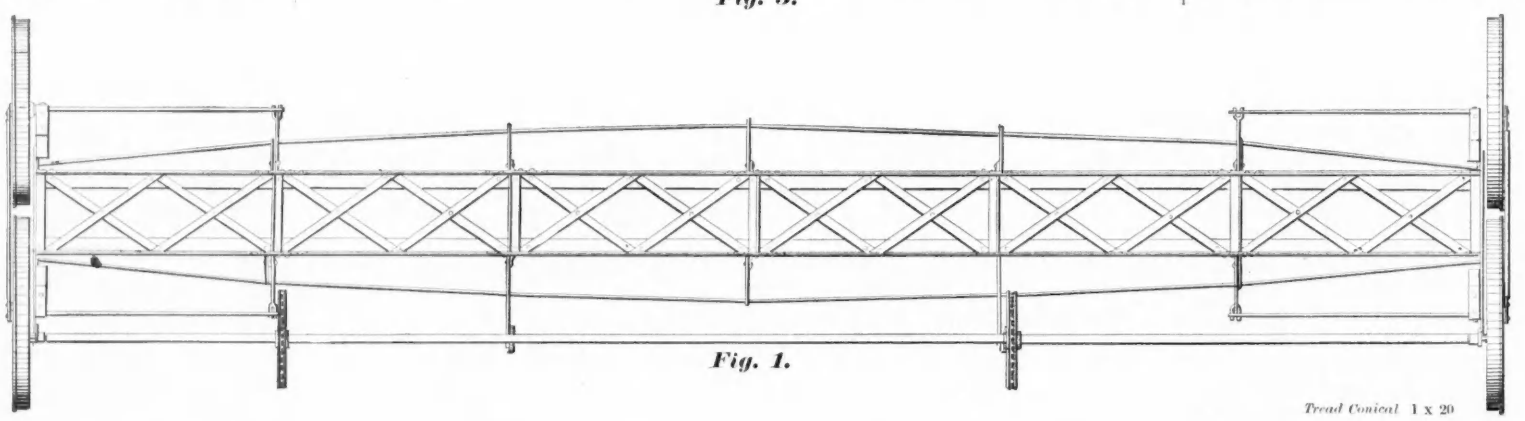


Fig. 1.

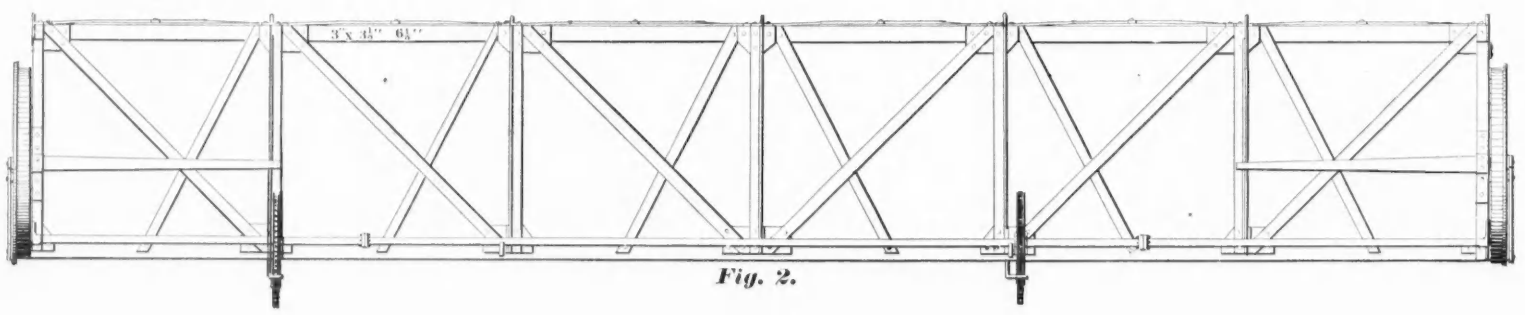


Fig. 2.

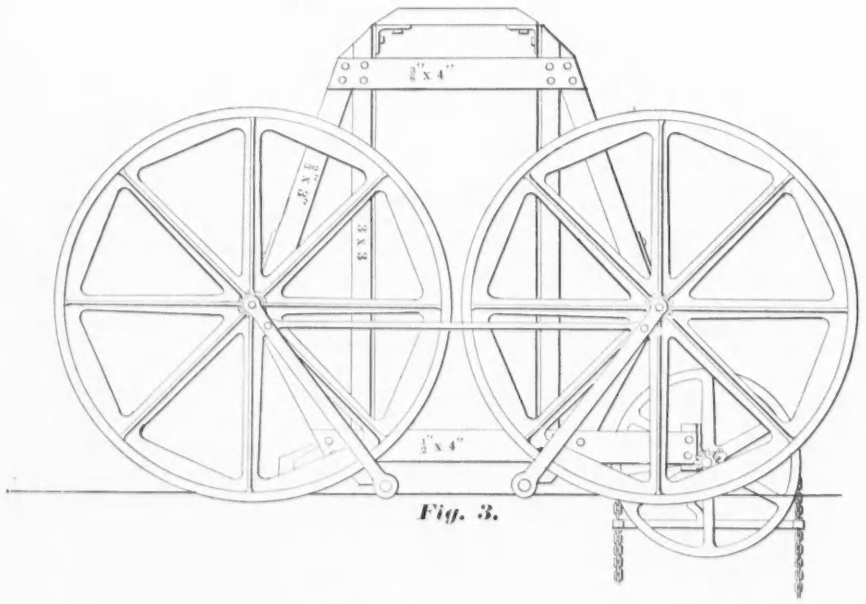


Fig. 3.

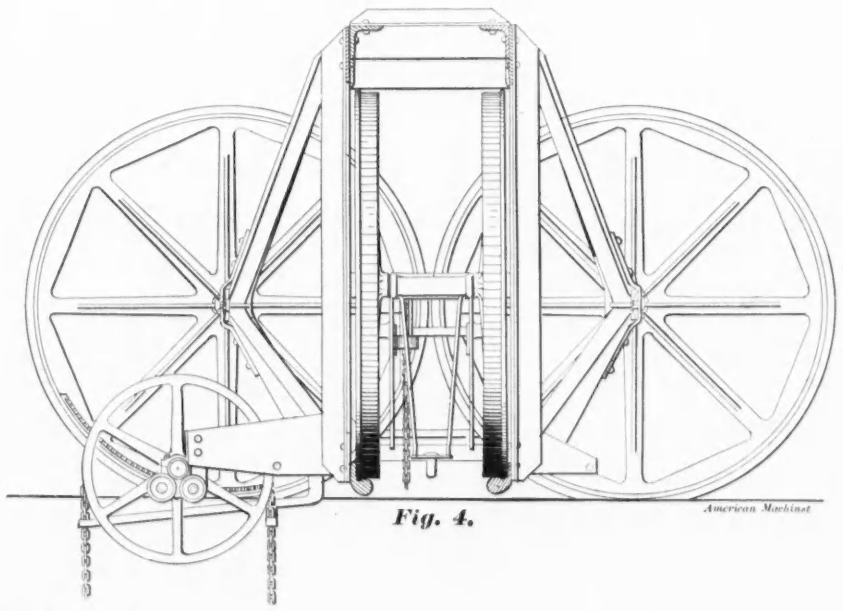


Fig. 4.

HAND-POWER TRAVELING CRANE.

are used for the bridge, and two smaller ones, nine inches diameter, arranged as shown by Fig. 5, so that about nine-tenths the weight is borne by the larger wheels, which have internal gears fitted to them; and the traverse of trolley is obtained in the same way as for the bridge. These wheels run upon rails of the form shown in Figs. 4 and 5, which is a commercial shape known as Carnegie No. 345.

It was the original intention to attach to the trolley a hydraulic cylinder or jack, the lever to be worked by hand for raising the weight, and the large hole through the frame of the trolley was intended to receive this cylinder. Nothing suitable in the way of a hydraulic lifting device seemed available, however, and one of the triplex chain blocks, made by the Yale & Towne Manufacturing Company, and illustrated in our issue of September 18, '90, was substituted. The block used has a nominal capacity for one ton weight, and its hoisting chain is passed over multiplying sheaves to give the required capacity of five tons.

The method of making the internal gears for the large wheels is something of a novelty. The teeth were first cut upon a straight bar which had been planed to the proper size, after which the racks thus formed were run through bending rolls, and thus bent to the proper circle, allowance having been made for the change in the shape of the spaces between the teeth by the bending. These, after trimming the ends to the proper length, were riveted in place in the wheels, with the result of having good internal gears with cut teeth. As Professor Sweet himself says, it seems rather odd to be talking of hand-power traveling cranes in these days of power-driven cranes of all kinds, are connected by a shaft made of wrought-iron pipe carrying a pinion at each end. This shaft is rotated by either of two sprocket wheels and chains, and is supported upon anti-friction rollers. No squaring device is used, and none has appeared to be necessary, as there seems to be no tendency to get out of square on the rails.

The trolley has two of the same wheels as

but for the work done in this shop the crane is powerful enough, and one man easily does all the work there is to do, and, of course, he could do no more with a power-driven crane, though it would require his constant attendance just the same.

Melting Iron—Melting Tin Scrap.

BY CHARLES SMITH.

When the fire in the cupola burns up slow (which will sometimes occur if the wood is wet or the draught poor), and the melter is waiting for the fire to come through his fuel before charging on the metal, matters can be hurried and no harm done by putting on the blast, being careful to have the wind-gate closed part way, that the wind pressure will not lift or disturb the fuel bed. Usually ten minutes with the blast on will bring the fuel bed to a red glow; the furnace is then ready for charging on the metal.

If the metal comes dull in the early part of the heat, the fuel bed is weak. If it comes dull on the start and gets sharp afterwards, the bottom fuel bed has been strengthened by the accession of the after fuel charges, and is thus enabled to send the metal along in proper shape; for about all melting is done with the bottom bed, and the steady feeding of the after charges is what keeps it replenished and in shape for melting properly. If the metal starts sharp, and afterwards becomes dull, the bed is right, but the after charges of metal are too heavy or the fuel charges too light; good judgment will decide at once where to apply the remedy here.

The last place to try and economize about the cupola is on the first bed of fuel; it is the backbone of the entire heat. Coke is now the accepted fuel for melting iron in foundries, as nearly all foundrymen will acknowledge. It melts iron faster than coal, requires less wood to ignite, burns up to the point of receiving the metal quicker, leaves more opening for the free circulation of blast, and in a great many localities costs less than coal, and, pound for pound, it will melt iron sharper and faster than coal. Very good results are obtained by mixing coal and coke—one-half each—on fuel bed, and after charges, and a great many good foundrymen are using their fuel for melting in that way. A 28″ cupola should have from 300 to 400 pounds of coke on bottom bed; a 36″ cupola, seven to eight hundred pounds; a 48″ cupola, fifteen hundred pounds, and a 60″ cupola should have one ton of fuel on bottom bed. Some get along and claim to do good work with less, but for practical, every-day working, these figures will be found safe to follow.

Better results will follow in the foundry melting six or seven pounds of metal to one of fuel than can be obtained by trying to melt nine or ten pounds of metal with one of fuel.

It takes an expert with favorable conditions to do the latter, while the former is quite practicable, and brings the metal along in good shape to handle. To every pound of fuel on the bed, three, and sometimes four pounds of metal can be added with safety, if the cupola has proper blast; in after charges, to every pound of fuel add eight to ten pounds of metal; any well-constructed cupola will stand ten.

Strength and softness in castings are secured in mixing the metal at the cupola; the molder has only to do with getting them clean. Metal intended for finished work should stand long enough in the ladle before pouring to give the impurities a chance to rise to the surface; to do this successfully, metal must be melted quite hot. A good molder's judgment will tell him when the metal is just right to pour with best results. The nature of molding obliges a mechanic at the trade to take a great many chances, over which he has little or no control; this being the case, he should never take one intentionally.

When the furnace is first stopped up preparatory to taking off the heat, a large ladle should be placed on the horses, to be used for a tapping ladle, if the metal coming along on the start is intended to be handled in bull ladles. The object of this is to give the metal all possible chance to mix well. For the same reason the furnace should not be tapped until quite a body of metal has gathered in the bottom. If this plan is followed, one first gets a mixture in charging; next when it melts and drops into the bottom of the cupola; again when it is caught in the large ladle and cut up and mixed by the stream coming from the cupola; and lastly, when it is poured from the receiver into the bull ladles. If this plan is adopted, one is giving the metal the best possible chance to mix thoroughly; besides, if the furnace should get a high head on, melting faster than it can readily be handled, the large receiver will take the iron and ease the furnace, allowing time to handle the metal successfully.

There are places, of course, where the metal is needed to be so extremely hot when received into the pouring ladles, that to catch it first in a catch basin would dull it to such an extent that it could not be handled to run into light work. This applies mostly to single-hand work. In such a case let the metal gather in the bottom of the cupola before tapping. Under the circumstances you will then be doing all, practically, you can to secure a mixture of your melting metals. When the metal is caught in large ladles, holding from fifteen to eighteen hundred pounds, and drawn to the floors on trucks, there to be handled in bulls and single hands, a good mixture is secured, and a foundry employing a great many molders, and daily handling tons of metal in bull ladles, will find it good economy to use the truck system. Where this is practiced the life is not dragged out of the men, bulling iron from the furnace in ladles that get heavier every time they go back after a fresh load; consequently the men have more heart to work. No one knows the quiet wrenching a bull ladle can give a man unless he has handled, practically, the double and spear end.

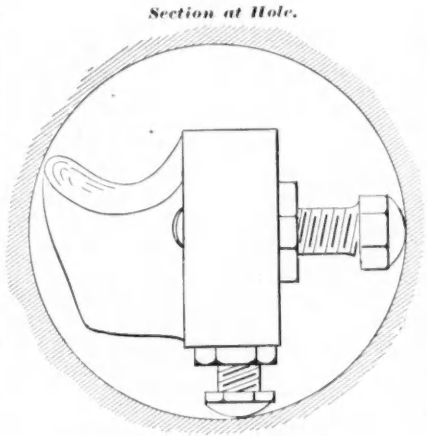
The introduction of the molding machine into a foundry, and often its success after introduction, is hampered by the hostility of the molders, and one of their most serious objections is to the amount of metal to be daily handled, in bull ladles, on the floor where it is in use. Half the dislike to the trade of molding is caused by the extremely hard work unavoidably attending it. The cutting up of sand, the shoveling into the flasks, the amount of energy expended in ramming up the molds, are some of the laborious parts of the trade, which the machine, with its sand cutter and conveyer attachment, will accomplish, and do fully as well, or better, than can be done by hand. Drawing the pattern and finishing the mold is quite agreeable work, and if we carry the metal to the machine floor on trucks we will be removing some of the prejudice—by molders—to the introduction of the molding machine in foundries.

The only cupola where it was the writer's good fortune to get a chance to experiment with melting scrap tin was a 36″ one (inside), and we were able to handle a great many tons of it in the following manner, though our experience warrants us in believing that there is very little profit to the manufacturer in using scrap tin in a cupola, small as the one in which we experimented:

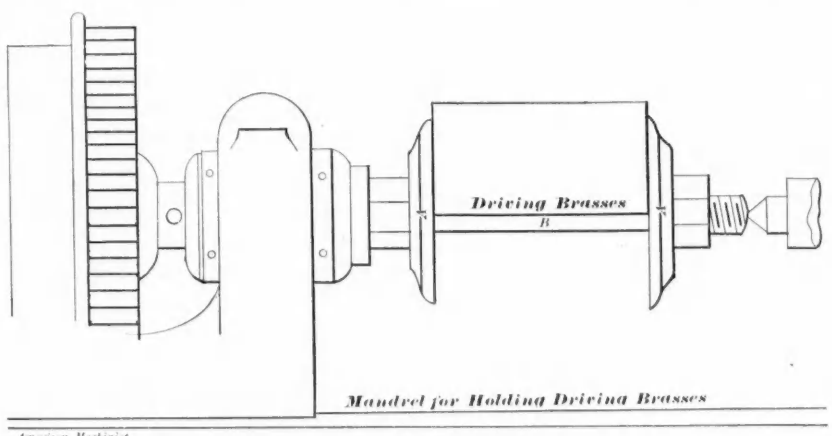
Get a circular piece of wood 6″ in diameter and 1½″ thick; bed it in the sand heap in open sand, then take a piece of 1½″ pipe, four feet long, and stand it up in the center of the open mold; get some one to hold it steady there and pour metal into the mold; it will quickly chill or harden there, and you will then have a rammer with which to pound your scrap tin into pig or bulk, to be handled quickly, or weighed, if accurate results are needed to be attained.

Next saw an oil barrel in halves, fill one of the halves with scrap tin and pound down with the rammer previously prepared. You will find the tin will knit close together, and when the mass is pounded solid nearly to the barrel rim, turn the vessel upside down; the contents inside will drop out readily and will be in fine shape to handle to weigh and charge on the cupola. Charge the cupola in the ordinary way, substituting one-half as much weight in scrap tin as one would use in charging iron; or, in other words, if customary to charge one ton of iron to a charge, charge but one-half ton of tin scrap, but make no reduction in the fuel charges; charge fuel the same as when melting iron. It will be found a wise precaution to place a little scrap iron on the fuel bed, say two or three hundred pounds, before first charging on tin scrap. This iron will come down hot and sharp, will warm up the tapping spout, can be caught and turned from ladle to ladle, and will leave everything warmed up in good shape to receive the tin scrap coming after. If the tin scrap were allowed to come first, the spout and ladles, and perhaps not too dry a furnace bottom, would tend to make that short-lived metal chill rapidly.

Section at Hole.



Boring Tool for long Holes.



Mandrel for Holding Driving Brasses

American Machinist

To Philadelphia in Ninety Minutes.

Wm. Barnet Le Van, in a recent lecture at the Franklin Institute, again discussed the subject of reducing the running time of passenger trains between New York and Philadelphia. He still believes the run ought to be made in ninety minutes. This he thinks can be brought about by the use of locomotives with single drivers. In England, locomotives with single drivers showed a saving over coupled drivers of about 10 per cent. in fuel. Locomotives of the English type, he thinks, would reduce the coal consumption between New York and Philadelphia from fifty to thirty tons per mile. Regarding lighter trains, the speaker said:

"Whatever railroad managers may think of the economy of running light and frequent trains, at reduced fares, there can be no doubt that they are a popular want. The cost of moving trains at any given speed is, all other things being equal, almost exactly in proportion to the weight moved. It can be stated positively, in view of the data before cited, that passenger trains of reduced weights, and drawn by single locomotives, according to the English system, and affording all requisite comfort to the traveling public, can be run between New York and Philadelphia in ninety minutes, and involving a consumption of coal of but a fraction over one-half of that now consumed in making the two-hour run."

LETTERS FROM PRACTICAL MEN.

Mandrel for Holding Brasses—Boring a Small, Deep Hole.

Editor American Machinist:

As the turning of driving brasses is a very frequent job in railroad shops, and seeing so many illy made affairs for holding them while turning the outside, I feel constrained to send you a sketch of a very convenient and efficient method of holding and driving them. The bolt *B*, enlarged at one end into a large hexagonal nut, screws on the spindle of the lathe. On the other end is a thread and nut, as shown. The two washers *A*, being closed upon brass, as represented. This is neat and strong, and serves much better than the majority of devices for such work that I have seen.

Not long since an occasion arose for boring a small, deep hole in a casting on a boring-mill. After some speculation it was concluded to try the scheme as suggested by sketch. Further description is hardly needed. The hole was started perfectly true by means of a short, stiff tool, thereby allowing perfect adjustment of set-screws on finishing tool. The hole came out remarkably straight and smooth. Had this hole extended entirely through the casting we could have used the ordinary boring bar, but such not being the case, this expedient was tried with success.

I do not know that this would work on a lathe, as perhaps the chips would work under set-screw and disturb the position of the tool; this, however, did not occur with the mill, as the chips fell down and out of the way.

L. C. SHARP.

Engine Breakdowns—Automatic Dampers.

Editor American Machinist:

Several references have been recently made in the columns of the AMERICAN MACHINIST to a certain Corliss engine breakdown, and from the various explanations tendered as to the cause thereof, I gather that there was absent from this engine a very simple preventive of runaway breakdowns. Though I have no absolute personal knowledge of the deficiency being general in America, I should expect it to be so, from the fact that, so far, no one seems to have drawn attention to it.

The preventive which I have in my mind is very usual here on all large and costly engines, which, from the twisting off of a shaft or similar cause, might be made to run away and come to smash. We term it the knock-off motion, and its construction and action are as follows: There is a valve on the engine steam pipe, which, when left free, will close and shut off steam. It is kept from closing by a simple detent similar to some forms of Corliss gear release motion. This detent is connected with the rod from the engine governor in such a manner that no motion is communicated from the rod to the detent between speeds of 10 per cent. above, and 10 per cent. below the standard speed of the engine or governor. Should the engine either exceed or fall below its proper speed by this percentage, the release is actuated, the valve drops, steam is shut off, and all stops.

Thus not only will the knock-off act if the second-motion shaft twists off, but it will also act if the governor belt slips or breaks, and with a well-loaded engine demanding a steady high boiler pressure to keep up to speed, it will act if the steam pressure falls unduly low. Fifty methods of arranging such a motion will suggest themselves to your readers. The percentage of variation from standard speed may be adjusted as finely as desired, and how close a speed is necessary those connected with textile industries will perhaps best tell us. A sepa-

rate valve is not necessary for the purpose. The motion is sometimes fitted in such a manner that the valve spindle is connected through a detent to a hand lever which serves as a starting valve, and this disconnection is effected by the action of a falling weight, which is set free by the abnormal motion of the governor rod. I was once invited to inspect one such knock-off motion, to which had been added an electro-magnet. This did the first release, setting the falling weight free, and the pressing of a button, of which there could so easily be a score accessible in every room of the mill, was sufficient to stop the engine.

Another device, the particular arrangements of which I cannot now call to mind, was a pneumatic arrangement, invented by a man who had less faith in electricity. He carried air-tight tubes to every part of the building from which he wished it to be possible to stop the engine. These tubes ended in cylindrical boxes closed by plates of thin glass, easily broken if desired, and serving as indicators, also, to show any willful stoppage without good cause.

The tubes were *filled with a vacuum*, to quote an expression once heard, and on destroying the vacuum the engine stopped through the detent being released.

The delay which sometimes occurs in stopping an engine when a fellow creature is being destroyed, is enough to warrant a liberal use of such measures, which may readily form a part of the simple motion whereby the engine stops itself if too quick or slow, and such attachments are cheap enough to allow of no excuse for their non-adoption when known. By employing a falling weight as an intermediary between the valve and the governor release, the valve will have a larger margin of holding up ability than it could possibly have if held by the detent acted upon directly by the governor. As it is, this detent easily holds up the weight to a position of potential energy by a small margin of detent motion, and the weight, though easily held up, falls like a hammer and insures the release of the heavier detented throttle valve.

Of course the stopping of an engine when running too slowly is in some trades a necessity. The yarn spun on certain cotton-spinning frames will be bad and soft if the spindles run too slowly. As a matter of special safeguard in addition to shutting off steam, an air connection to the condenser will effect more certain stoppage, and there is no reason why a brake should not at the same time be brought into action upon the fly wheel, the steam connection to the brake cylinder being simultaneous with the knock-off of the throttle. This last device has, however, never come under my view, if it has ever been adopted.

Whilst on this subject of automatic motions, there occurs to me a very neat arrangement of steam damper, in which a small steam cylinder several feet in length was employed to actuate the damper, which was of the ordinary shut down type hung by a chain over a wheel, the opposite end of the chain being the steam piston.

The boiler was mechanically fired, and the same device which actuated the steam damper also regulated the cone strap of the coal feed. There was no waste of steam in the damper cylinder, which was really hydraulic, the damper being kept open by the head of water above the piston, below which the steam acted, the arrangement being somewhat as shown in sketch, the water tank, of course, being of such area that the head of water would not be too much increased by the addition of the cylinder full of water, when the steam pressure forced upwards the piston.

At the same time, the water tank would not be too large in area, for, if it were, the hydraulic head would be practically stationary and constant, and a very small difference of pressure would either wholly close or fully open the damper. With a proper tank area the hydraulic pressure increases with the rise of the piston, and the damper, therefore, is only partially closed, for the enhanced steam pressure is balanced by the increased water pressure. A further rise of steam pressure would still further close the damper, and again add to the hydraulic pressure. In this way the action known as "hunting," in the steam engine governor, and due to over-sensitiveness, may be quite obviated.

It is obvious that, with a vertically placed brake cylinder, the head of water decreases as the piston rises, by the amount of the rise. This, however, is balanced by the corresponding decrease on the under side of the piston.

If the steam pipe from the brake cylinder falls all the way back to the boiler, then it is clear that the water tank must have an area less than the area of the brake cylinder, or else no increase of head could follow the rise of the piston.

The water tank is then merely a pipe carried up towards or above the roof.

The proportioning of parts is merely a question of figures. With high steam pressure, the lower side of the piston may require reduction of area by a thick tail-rod to avoid too high a water tank.

The idea naturally occurs to one that a differential cylinder, as in Fig. 2, might be made to serve this and similar purposes, both ends being connected to the boiler, and the apparatus balanced at a certain position and pressure, representing standard pressure and normal damper opening; any change of pressure would alter the balance, and the piston would move away from or towards its end of larger area, which would, of course, gain or lose more than the smaller area. The steadying power might be a long coil spring serving the purpose of the water head of the previous arrangement.

The best of Fig. 1 design is that any man can rig up his own, if he only have a yard or five feet of smooth bore pipe to start with, and can make the stuffing-box. Of course, if the water head necessary be excessive, it can be reduced either by reducing the lower side area of the piston, as above stated, or part of the steam pressure and damper weight can be balanced by weights at *A* or *C*. Every plan will present its own separate problem.

W. H. BOOTH.

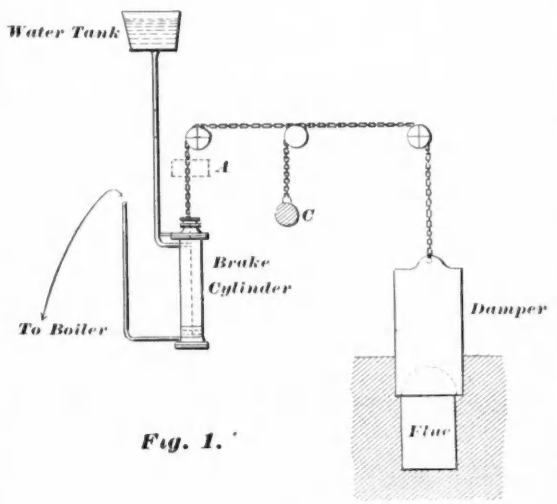


Fig. 1.

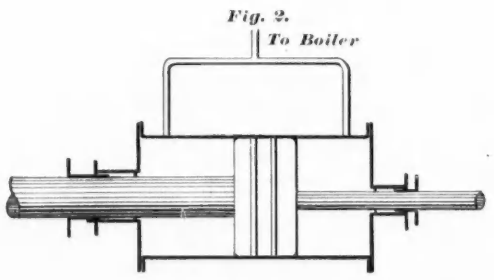


Fig. 2.

Facing Joints of Cylinders.

Editor American Machinist:

I had a pair of cylinders that had ground joints to bore out, and I had an ordinary bar without any attachment for facing, just a head to carry the boring tool. I knew it would require two or three days hard work to scrape and grind these joints after boring the cylinders, so I adopted the following plan for facing them:

When I had a cylinder bored and counterbored, I took the blocking I had to block the spider away with, and placed it outside the studs. Then I made a tool the same as for boring, only it was a side tool. This tool I put in the boring bar head, holding it just sufficiently hard so it could be fed out when the bar was running, by driving against the end.

The ba· being true with the bore, and the slot in the head planed, of course the joint must come true.

I hung a weight so it kept the slack of the bar against the faced joint.

This may not be new to some, and may be new to others; I give it for what it is worth. I have frequently seen instances where scraping and grinding were depended on to make the joint; this isn't a desirable operation anyway, the job was not well done, and the joint leaked in a short time. MACHINIST.

Turning a Commutator.

Editor American Machinist:

In your issue of January 29th there appeared a short paragraph by X., in regard to turning down a commutator on a motor, and the method he described seems open to criticism. It is difficult to see the object in filing the commutator after it was turned, for the turning ought to make it as smooth as necessary, and surely as smooth as filing.

It is a good plan to avoid filing any round surface unless it is absolutely necessary; it is a crude way of working, at best, and never leaves work as round as the lathe, which we know is not often perfect. Knowing that the lathe can hardly ever turn exactly round, it seems a step backward to try filing as a remedy, though in this case it was to smooth the commutator, instead of to true it. But as we know that filing will cut work out of round, it is not good practice to file when a round surface is desired, and it is desired on the commutator of a motor or dynamo as much as any place that I know of.

A commutator should not be filed when it is possible to turn it, as the particles of copper that are filed off have a great tendency to become pressed into the insulation between the bars or segments, forming a connection with the attendant short circuit and sparking, which will soon make a very rough segment at the place of short circuit. A short circuit in the coils of the armature, or the cause just mentioned, is a fruitful source of rough commutators, especially when the "roughing up" is confined to two or three segments.

In place of filing after turning (if the commutator is not smooth enough to run as the turning tool left it) it is common practice to use fine emery cloth fastened to a block of wood, and held against the commutator by a steady pressure; this is sometimes sufficient with the turning operation first; but, as before stated, the lathe will do the best job without any filing or emery cloth being necessary.

We all know the tendency of files to clog up, and the scratches that follow are not soothing to the ruffled temper. A little chalk rubbed into the teeth will usually prevent this difficulty, the chalk filling the teeth, and as two particles of matter cannot occupy the same space at the same time the filings cannot become fastened in the teeth.

Too much care cannot be taken of the commutator; it should be carefully watched, and attended to as soon as it shows signs of wear, and should not be allowed to spark, as this makes the commutator rough, and also destroys the brushes.

It is too often the case with isolated plants that the attendant has little or no knowledge of the machine or its action, and as a result the machine is often condemned as inefficient or the whole system of lighting is declared to be a failure. I know of several cases where this cause led to the condemnation of lamps and everything else in general, when in reality the cause of failure was the constant "monkeying" that the proprietor seemed to think necessary, resulting in burnt lamps and fuses, sparking at the brushes, and the ever attending rough commutator. In this same plant it is no very uncommon sight to see line of fire run along the wires, which fortunately has not as yet set fire to the woodwork or the fire inspectors would take a hand in the game. This is caused by a lack of ideas on the subject, which approaches incompetency in mechanical details, for when we see wires strung so as to be rubbed by a passing belt as soon as it becomes slack, or with the cleats pulled off the walls, and the wires twisted so that a short circuit is liable to occur at any time, we wonder that the isolated plant has the success it does. Common sense applies here as elsewhere. FRED H. COLVIN.

"Measurement of Power."

Editor American Machinist:

I was glad to note Mr. Webber's criticism on "Measurement of Power," which appeared in your issue of January 22d, relating to the hydraulic regulator on scale beams. It emphasizes a good point, which, although not given much prominence in my previous articles, had not been overlooked.

Prior to the mention of the Emerson power scale "dash-pot," attention was directed to this form of regulator in connection with Professor Richards' absorption dynamometer in the fourth paper of the series, where it reads: "In order that there should be a minimum amount of vibration of the scale beam while weighing the pressures, a rod and dash-pot were used—the latter being supported by an arm attached to the side of the scales." (See Fig. 4, page 11, AMERICAN MACHINIST of December 11, 1890.)

The arrangement is also shown in the balance dynamometer referred to by Mr. Webber (see Fig. 7, issue of December 25th, not January 1st, as inadvertently given by Mr. Webber); and in the belt dynamometer designed by Mr. Briggs, also shown in your issue of December 25. J. J. FLATHER.

The Steel Question.

Editor American Machinist:

The communication of Mr. Edward S. Taber in regard to duties on Stubs' steel rods and wire, in your issue of Jan. 29th, brings afresh to my mind the question: Why cannot American steel manufacturers produce steel equal in quality and uniformity to Stubs'? Having tried many kinds of American steel for small tools, and found them all inferior to Stubs', I ask Mr. Taber or any readers of the AMERICAN MACHINIST for an answer to the above question.

Norwich, Conn. WM. H. STEDMAN.

Tool-boxes and a Tool-room.

Editor American Machinist:

I find a good many sensible things by A Mechanic in your issue of Jan. 29. One is, showing up the machine shop where no regard is paid to system; where every man has his own tool-room, in the way of a big drawer or box, well secured with a big padlock, and even that would not keep burglars out.

I have passed through the mill myself—worked in a shop of that kind—and of course had my big drawer well stocked with the tools necessary for the business; it was found very handy as a receptacle for all kinds of odds and ends, until some mean fellow would tell the foreman that Ben had all the tools locked up in his drawer, then I would have to unload and give them all away to a lot of lazy fellows, too lazy to make their own tools; I would have to make a new lot.

Now, here is where the benefit of a tool-room comes in. Since the time spoken of above, I have got a shop of my own, employing about 125 men; and a large, commodious tool-room was the first thing in order, and all supplies pertaining to the business are in the tool-room, and cannot be taken out without a check or an order from the foreman. Each workman has four or six brass checks, with his number stamped on. When he goes to the window for a tool, he has to leave one of his checks, which is hung up in the tool-room, where the tool is taken from. When he returns the tool in good condition then he

gets his check back, and if the tool is not in good condition he must be able to tell the reason why. In this way you can keep track of the tools.

If the same tool should be called for by another party, by going to the place where the tool belongs you are confronted with check number so and so, and you will be told by the tool man that Tom Tucker has got it.

Anything besides tools cannot be taken from the tool-room without an order, and whatever is taken is charged up to the job for which it is intended.

The jobs are numbered one, two, three, four, as the case may be. The time of the man is charged the same way. By this means we can come at the exact cost of all the work that is done.

There is an old saying that it takes a rogue to catch a rogue. I presume what is meant by that is that he is up to the tricks in the trade. In the times spoken of, when every machinist had his own tool-room, I worked in a railroad shop, and did a great deal of night work, overhauling engines that had to go out with their regular trains in the morning. Of course I found the big drawer very handy; could always find something in it that would answer the purpose.

Any one that has tried to set out the old-fashioned spring packing in a locomotive cylinder has often found trouble in getting the follower off after the bolts were out. To overcome this, I had two steel eye-bolts made, about six inches long, with the ends threaded and fluted like a taper tap, and large enough to cut a screw in the holes of the follower. These were screwed tight into the follower head, and a short steel bar put through the open ends of the eye-bolts; then I would pinch the engine back with the pinch bar. As the engine moved the steel bar would rest against the cylinder flange, and the followers would come off very time.

BENJ. F. HETHERINGTON.

Gutta Percha Follow Boards.

Editor American Machinist:

With reference to the inquiry on last column of page 2, Jan. 22d issue, about the use of old gutta percha articles, about all the use it is put to is to grind it into a dust and the dust is added in certain percentage of compound for new stock to be vulcanized. *It might* be made into plow follow boards that way, but the follow boards would be of doubtful service.

S. R. BROWN,
Brown Comb Co.

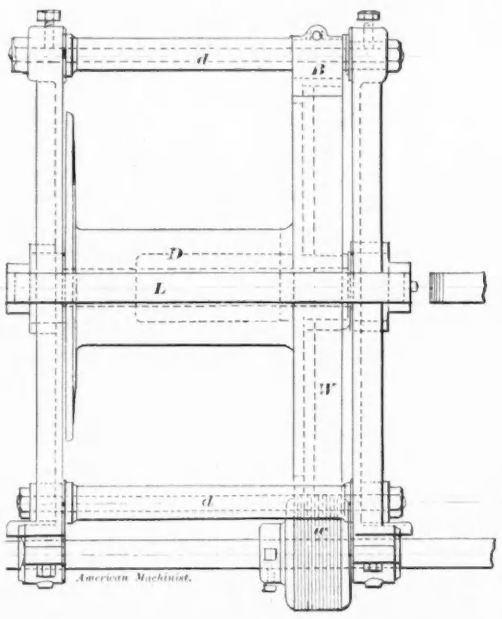
Wappinger Falls, N. Y.

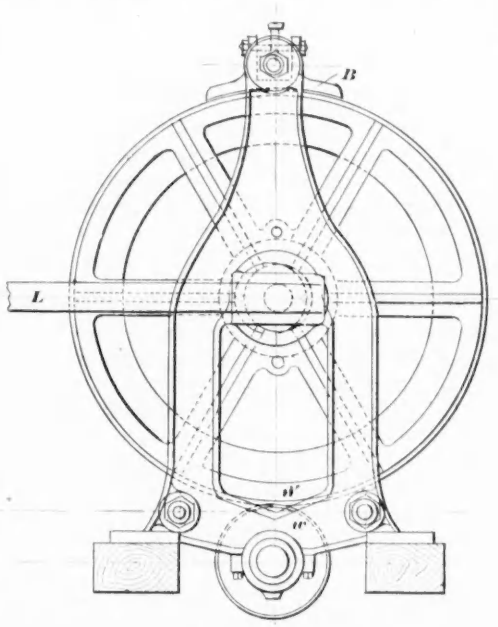
The machinery now in use by the life-saving service is about as perfect as anything can be.—*Mail and Express.*

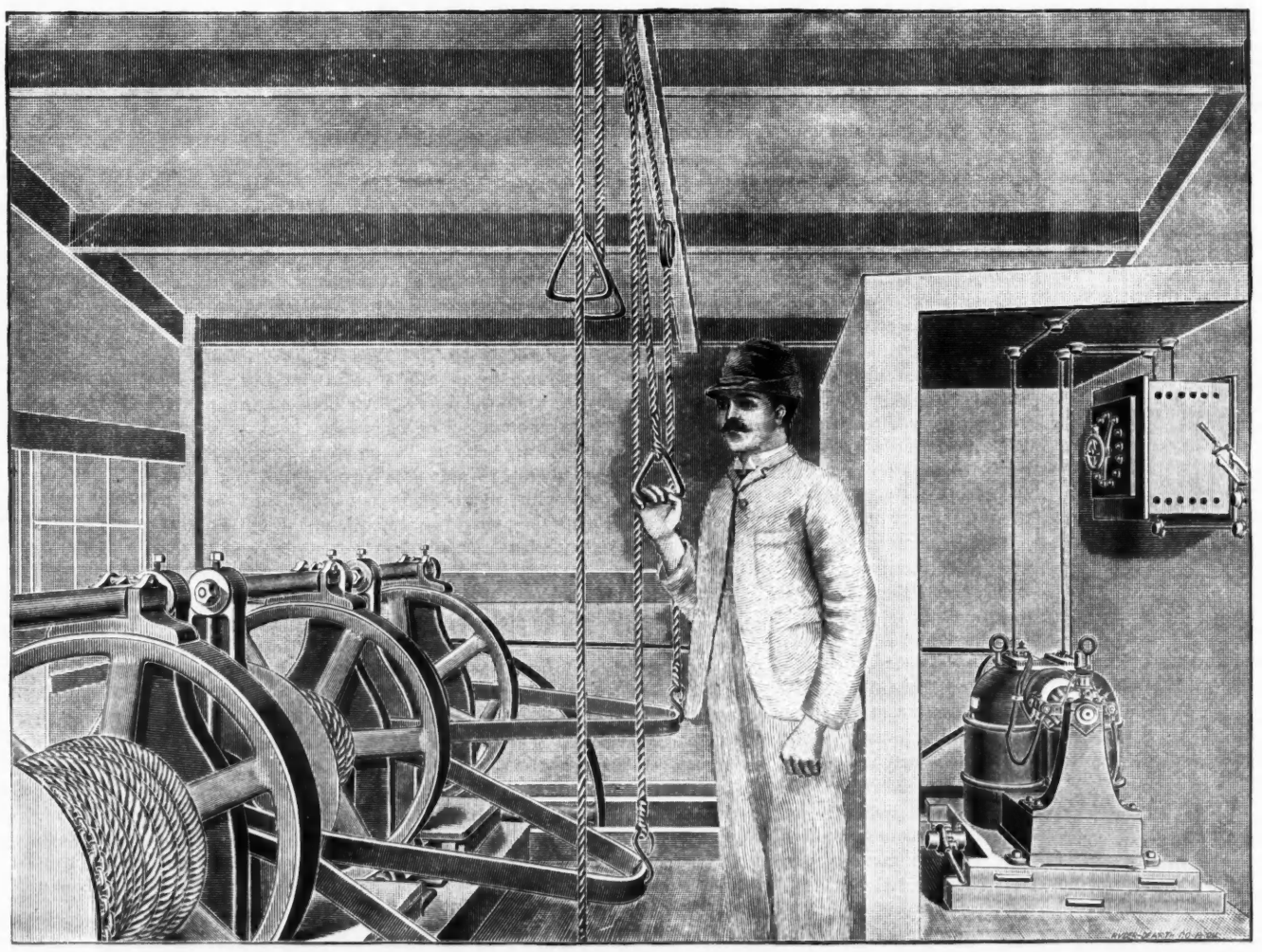
We hope no one will take this as the expression of a fact; because, if he did, he would rest content without trying to improve this "machinery." The machinery of the life-saving service is excellent as we see such things to-day, but fifty years from to-day it would be laughed at. There is abundant room for improvement here as elsewhere; inventors in this direction need not despair.

Improved Whip Hoist.

Some time since we referred to a plant of machinery put in at Providence, R. I., by Volney W. Mason & Co., of that place, for hoisting (from a vessel or car) lumber and transferring it rapidly to any desired part of a large lumber yard. Practically the same machinery has since been put in at several places in this city and vicinity where large quantities of goods are to be handled, notably at Palmer's Docks, in Brooklyn, and at the warehouse of the New York Central Railroad, this city, where there are 61 separate hoisting machines, all alike, upon a single line of shafting 600 feet long.







IMPROVED WHIP HOIST.

Our illustrations are made from the plant first referred to, as put in at Providence, where the shaft is driven by electricity, as shown.

Power is supplied by a 10 horse-power motor running at a speed of 1,600 turns per minute, the pulley on motor being 8" diameter and that on main shaft of hoisting machines 60", connected by 6" belt. In this plant the driving shaft runs along the floor beneath the hoists, the construction of which is shown by our detail cut. It consists of two hangers (inverted in this instance), kept in the proper relative positions by the distance pieces *d d*, which are cast sleeves, through which pass the bolts from side to side.

About midway the height of these hangers a bearing is provided for the winding drum *D*, which is made smooth, as shown, or larger and grooved, according as hemp or wire rope is to be used, and is supported at both ends by eccentrics, which are fitted to the hangers, and to these eccentrics is attached the lever *L*, which resembles a semi-circle in form, and passes around from the eccentric on the one side to that on the other.

At one end of the winding drum is the large friction wheel *W*, which, when the lever *L* is pulled upwards, is forced down into contact with the small friction wheel *w*, which is keyed to the driving shaft, and is made of layers of specially prepared paper, held by six bolts between two flanges of iron, and motion is thus given to the drum. Upon releasing the lever *L* it falls, and not only raises the wheel *W* off the small friction wheel, but carries it further up against the brake shoe *B*, which is fixed at the top of the frame and arranged to be easily adjusted to compensate for wear, or for removal in case a new face is to be put upon it, leather being used for this purpose.

The man who operates the hoists needs only to pull down upon the rope shown to set any hoist in motion, and when he lets go, either purposely or from any other cause, the load is automatically held suspended, and by holding on the brake, the pressure, and consequently the speed of lowering the load may be varied at pleasure. The speed of hoisting may be almost anything, depending upon the kind of goods to be handled and the distance they are to be moved, rather than upon the limitations of the machine itself. At the New York Central plant it is 300 feet per minute.

The winding ropes, after they leave the drums, may be carried in any desired direction by means of suitable sheaves, one of those used in Providence going to the hold of a vessel for hoisting out lumber, while others go to various parts of the yard through troughs laid in the ground, so that teams may drive over them, and are used for moving lumber about or loading wagons by means of derricks.

The same machines are used where they are to be attached to a ceiling or overhead framing, being, in this case, simply attached in an inverted position. In most machinery of this character there are several points to be watched by the attendant, one lever to be handled for hoisting and another for lowering or applying the brake, so that an attendant, by "losing his head," could cause an accident, which with these machines is impossible; for the brake is automatically applied upon releasing the handle, and if the load is drawn up until it strikes an obstruction the friction wheels simply slip upon each other, and no harm is done. For most kinds of work it is, therefore, an easy matter for one man to attend two, and in some cases even three machines.

A new process for making joints in lead pipe has been patented in England. First a tool with a conical internal recess is driven on the end of the pipe; this decreases its size so that one end of a right and left-hand coupling nut will slip over it. Then a plug is driven into the end of the pipe, which forces the metal out and into the threads of the nut, forming a screw. The other part of the pipe being similarly treated with the other end of the coupling, the pipes can be coupled or uncoupled at will.

We have a communication, in which the writer says he has often wondered "why some one has not applied steam reversing gear to the locomotive." Steam reverse has been used in this country for ten years—probably longer—a fact of which the writer does not seem to be aware.

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J. G. A. MEYER, } Associates.
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☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draftsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

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CONTENTS.

	PAGE.
Pipe Cutting and Threading Machine	1
On the Transmission of Power. By Peter H. Bullock	1, 2
Compound Electric Light Engines	2
Blacksmiths' Bolt Header	2
The Revolving Turret	2, 3
High and Low-water Alarm	3
English or American Steel	3
Friction Clutch	3
Treatment of an Industrial Paper—Use. By Jarno	3
A Hand-power Traveling Crane	4, 5
Melting Iron—Melting Tin Scrap. By Charles Smith	5
To Philadelphia in Ninety Minutes	5
Letters from Practical Men: Mandrel for Holding Brasses—Boring a Small, Deep Hole. By L. C. Sharp—Engine Breakdowns—Automatic Dampers. By W. H. Booth—Facing Joints of Cylinders. By Machinist—Turning a Commutator. By Fred. H. Colvin—"Measurement of Power." By J. J. Flather—The Steel Question. By Wm. H. Stedman—Tool-boxes and a Tool-room. By Benjamin F. Hetherington—Gutta Percha Follow Boards. By S. R. Brown	5, 6, 7
Improved Whip Hoist	7
A Widened Market for Machinery	8
Manufacturers vs. Farmers	8
Literary Notes	8, 9
Questions and Answers	9
Manufactures	9, 10
The National Association of Machinists	10, 11
Some Rolling-mill Notes. By C. O. Sine	11
The Performance of Engines on the S. S. City of Paris	11
Machinists' Supplies and Iron	12

A Widened Market for Machinery.

Action of considerable importance to American manufacturers of machinery has been taken by our own and the Brazilian governments, by which, under a reciprocal agreement, and in consideration of the admission into this country, free of duty, of certain specified articles, machinery of all kinds, except sewing machines, is to be admitted to Brazil free of duty, if of American manufacture. On other manufactures of all kinds the duty to be paid is reduced 25 per cent. This results from the exemption from duty (by the recent act of Congress) of sugars, molasses, coffee, and hides. There can be no doubt of the great importance of this arrangement to manufacturers of all kinds in the United States. Brazil already imports large amounts of machinery, much of it from England, and it is altogether likely that the demand for machinery there will be a constantly increasing one as the country develops. Why sewing machines should be excepted from the full benefits of this act is more than we can understand; but for what has been accomplished our American manufacturers are to be congratulated, and we hope that they will at once prepare to push their trade in that direction to the fullest possible extent. There should be a large trade there for us at once in many kinds of machinery such as are needed for the agricultural development of the country and for manufacturing sugar and building railroads, and this of course will lead to the development of a market for many other kinds of machinery, such as machine tools.

Manufacturers vs. Farmers.

In some of the central and western States a contest is being carried on between the manufacturers on the one hand and the farmers on the other, regarding the enactment of laws supposed to favor the interests of one or the other.

The farmers of the country have become pretty generally and firmly convinced that something is hurting them, and they have evidently determined to right things, without any very clear idea of what it is that is hurting them, or how things can be improved. It is perfectly proper, of course, for any body of men to take concerted action looking to the securing of justice and equal rights for themselves; but it is of the highest importance to them as well as to others that, before taking such action, its ultimate indirect as well as direct effects should, so far as possible, be understood; and, when it comes to a matter of taxation, knowledge of the effects can usually be founded only on a thorough study of the principles of taxation.

The farmers seem to have conceived the idea that the manufacturers escape from bearing anything like a fair proportion of the burdens of taxation, and to them it seems to be an easy matter to remedy this by simply giving the tax collector authority to collect additional taxes on manufactured articles ready for the market, or raw material stored or in process of manufacture; and they, innocently enough, think that every additional dollar which can be collected in this way will not only help to check the dangerous accumulation of capital in the hands of the manufacturers, but also correspondingly reduce the burdens of the farmers.

In Ohio, for instance, a bill has been introduced, and at last advices had actually passed one branch of the legislature, by the influence of the farmers, which requires every manufacturer to list for taxation all materials used during the year in carrying on his manufacturing operations, as well as all engines, machinery and tools of every description at a fair cash value, and every person who shall hold personal property of any description with a view to making a profit by changing it in any way, is to be considered a manufacturer, so far as the provisions of the law are concerned.

Now, it seems to us that the dullest farmer that ever turned a furrow ought to know that such a law would, if passed, utterly fail in accomplishing the object intended by its framers. Let us trace its effect in one instance.

There are blast furnaces in Ohio, and the owner of a blast furnace is by the terms of the law a manufacturer, and will be required to pay a tax upon all the iron ore and other materials used by him in the production of pig-iron. That is one tax. This pig-iron, we will suppose, goes to a mill near by, where it is made into bars of wrought-iron, and the manufacturer owning this mill must pay a tax upon all the pig-iron used by him, which makes the second tax on the same material. We will suppose the finished bars of iron to go to a factory which makes a specialty of manufacturing bolts and nuts, and here a tax must be paid upon all bar-iron used, which makes tax number three on the same material. These bolts and nuts then go to a factory where machines are built, and the manufacturer here must pay a tax upon all nuts and bolts used during the year, which makes tax number four which the same material would have to bear. A dozen such instances could be named, and they would show in the first place what a very heavy burden would be imposed by such a law, and how unequally it would fall upon different establishments, according as they themselves made or bought parts of their finished products. To illustrate this inequality, take the case of a manufacturer making a line of goods composed mainly of small castings and drop forgings. If he made these castings and drop forgings himself he would pay no tax except upon the pig and bar-iron of which they were made, while, if he bought them of manufacturers making a specialty of such work, he would have to re-imburse them for the taxes paid on them as raw material, with probably a profit on the taxes besides, and then himself pay an additional tax upon the castings and forgings. This total additional cost he would have to add to the price of his finished product, to be eventually paid by the consumer. In the case of agricultural machinery, which is extensively manufactured in Ohio, the consumer is the farmer himself, and it ought to be easy for him to see the final effect of the law. In the case of other kinds of machinery and goods, the additional tax would not be so directly paid by him, but in the end he might rest assured that himself, together with the other consumers of the goods manufactured, would pay all the taxes of whatever description levied upon them. All this, of course, is predicated upon the assumption that manufacturers in other States where such laws were not in force are to be in some way prevented from shipping their goods in to compete with those made in Ohio; but of course they would so ship them, and to that extent close up manufactures in Ohio, and cause their transfer to other States, resulting in the loss, not only of the taxes, but of everything else of value resulting from the presence of manufactures. If all the States should pass such laws, then the final consumer of the manufactured goods would have no escape from the payment of all the taxes. The farmer could make the consumer of his products pay the additional cost of his farm machinery, if it were not for the fact that a large surplus of farm products is produced here, which must find a market by exportation to foreign countries in which prices are fixed with respect to the cheapest possible production in any country.

The fact is that neither the farmers nor consumers generally have any just cause to complain of manufacturers as such. Very few manufacturers not protected from competition by some sort of an unfair monopoly make more than a fair return upon their capital invested, with a fair recompense for useful work done in managing their business. There are many monopolies by which men are making more than this, and in some cases these monopolists are also manufacturers, in which case they make most of their money by reason of their being monopolists, not as manufacturers pure and simple. And the monopolists are regularly grinding the legitimate manufacturers as well as the farmers, and the remedy is not to lay additional burdens upon manufacturers, but to remove some of the facilities for building up and maintaining the monopolies.

When the farmers or any other body of men go to looking about for something to tax, they should examine to see whether the proposed taxes are likely to remain where imposed, or be shifted onto others, and whether the things taxed are in themselves desirable and useful or not, and, if they are desirable and useful, then whether or not they are likely to be driven elsewhere by the imposition of the proposed tax.

Those who—and they were legion—had the misfortune to be obliged to cross the ferries to and from New York during the prevalence of the recent uncommon fog, doubtlessly prayed earnestly, if not always with entire reverence, for some light that will penetrate a fog thick enough to be cut with a knife—penetrate it sufficiently to permit the ferryboats to make their trips without delay of more than an hour or two. It may be an impossibility to invent a light that will answer all the requirements, but, because it has been tried and has failed is no reason why some persevering inventor may not yet succeed in bettering things. It must be admitted that the ferry companies, as it is, light up rather dimly on board and ashore, which fact was brought out quite prominently on one of the worst nights, by observing a vessel lying at one of the docks with two electric lights near the deck, making every rope visible at quite a distance, comparatively. The man who succeeds in lighting the North and East Rivers during a fog will be a public benefactor, and ought to get rich by his invention. The only apparent way to make things a trifle more pleasant just now is for the ferry companies to spend a little more money in foggy weather for electric lights.

A correspondent, who writes us that he is an apprentice in the machine shop of a railroad company, details some pretty bad shop practice, such as using large lathes for turning bolts when small ones are idle, and similar proceedings in regard to the use of planers, and machinists barring an engine while helpers set the valves, consuming exactly one and one-half days in the operation. After detailing several other instances that, if not overdrawn, show something loose, our correspondent inquires: Will some one tell me what show there is for an apprentice in a shop like this? It is unfortunate for an apprentice to find himself in a shop where slipshod methods prevail; still he should remember that it is he that must do the learning, and one of the best things to learn is what to avoid. If our correspondent does this—and he seems in a fair way for it—then does his work as well as he can learn how, he will probably come out all right in the end.

Mr. F. C. Fladd, who has for many years been connected with The Stiles and Parker Press Co., and for the past five years has had the management of their New York department, has accepted the position of assistant superintendent of The E. W. Bliss Co., Limited, 17 Adams street, Brooklyn, N. Y. Mr. Fladd is well known among users of sheet metal goods throughout the country, and has a host of friends who will wish him success in his new position.

Literary Notes.

THE AMERICAN PATENT SYSTEM. A Practical Guide to the Inventor and to the Investor in Patents. By D. Walter Brown, New York.

We consider this one of the most valuable little books ever published on the subject set forth in the title. It gives exactly the information the mechanic and inventor wants, and gives it in language so plain as not to be misunderstood. It also furnishes valuable information to the owners of patents, and to those about to purchase. All high sounding legal terms have been avoided, as well as forms of assignment, licenses, etc., which the author very wisely concludes would be merely a "delusion and a snare." The mechanic who carefully reads this book

will know what an invention really is, and what is required of him in obtaining a patent, told without unnecessary and unmeaning words. Although the author is a patent attorney, the reader will find nothing of an advertising nature in the book, it being, as he says in his preface, made up of articles originally published in the AMERICAN MACHINIST, to which some additions have been made. We most cheerfully commend the book. It is sold by newsdealers everywhere. Price, 25 cents.

QUESTIONS AND ANSWERS.

Questions of general interest relating to subjects discussed in our columns will receive attention in this department. The writer's name and address should always accompany the question. Neither correct initials nor location will be published when there is a request to that effect. If questions are enclosed with a business communication, they should be written on a separate sheet.

(71) A. K. N., ——, asks: Will you kindly inform me the best form of axle for an emery wheel of wood to run vertical, and at a speed of 2,000 turns per minute; and also tell me the best kind of bearing for it? *A.*—We cannot. You will probable derive some help, however, from the articles of Mr. Treacy on this subject, which have appeared in issues of December 4 and December 25, 1890, and January 29, 1891.

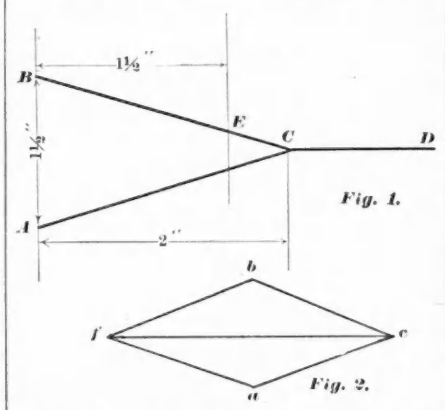
(72) W. C. D., San Francisco, Cal., writes: I have a space 2 inches by 1 inch by $\frac{7}{16}$ inch, in which I want to put a bell, or its equivalent in making a noise, that can be heard above the noise in the street as much as possible. What shape of bell placed in this space can I get the most sound of? *A.*—The space is too small for a bell of any practical value, and we do not know of any other device which could be used for making the desired noise.

(73) Novice, Yonkers, N. Y., asks: 1. In cutting threads in a lathe, does it make any difference what the size of the intermediate gear is? *A.*—No. 2. By using two intermediate gears can I cut a left-hand thread? *A.*—Yes. 3. What is the proper name of the clamp and screw that goes on cross-slide when cutting threads? *A.*—We cannot say. It has been called the cross-slide stop-screw and clamp, which is probably as nearly proper as any other name. 4. Can I turn the wrist of a crank in an ordinary lathe without special rigging, the crank having 6″ throw, and being in the center of the shaft, which is 7 feet long? *A.*—No; you must have more or less special rigging, though this may be of a very simple character. 5. In boring with a bar, is it best to center the work from the boring bar, or what is the usual way, say the job is a cylinder? *A.*—The usual way is to set by measurement from the boring bar.

(74) B. B. Atlanta, Ga., writes: We have a Birdsall semi-portable engine; its boiler is of the ordinary locomotive type. We wish to transform this boiler to a return tubular boiler by setting it in brick-work, and placing the grates underneath the smoke-box end, allowing the gases to pass underneath the boiler, from there up into the fire-box, and then return through the flues into the stack, as shown in our sketch. Please advise us if this arrangement will produce an economy in fuel, and if there is any hinderance to its practicability. Our object is to gain economy and obtain an increased steaming capacity. *A.*—You will probably gain some economy in fuel, but this will be offset by other objectionable features. There will be trouble in keeping the water space around the fire-box free from mud, and if it is not kept clean there will be danger of burning the end of the fire-box against which the gases impinge. From your sketch we assume that you intend to keep the engine on top of the boiler. This will be another objection, as vibrations, when the engine is running, cannot be avoided, and these will tend to loosen the brick-work. We do not favor your plan.

(75) C. F. G., —— asks: How are turret head tools, such as taps and dies, made for running up to a shoulder or to the bottom of a hole and have them slip off while the lathe is running, without the necessity for running them up by pulling the belt by hand? *A.*—The shank of the holder which holds the die or tap works freely in a sleeve, this sleeve being clamped in the turret instead of the shank of the holder. The outer end of the sleeve has a light flange upon it equal in size to the holder, and there are two short projecting steel pins in the face of this flange, and two corresponding ones in the holder, these pins locking together to prevent the turning of the holder while cutting threads. The pins are kept in engagement while the die is running on, by advancing the turret slide, but when this comes against its stop, which has been previously set, it can advance no further, and the die goes on, the holder moving endwise in the sleeve until the pins are disengaged, when the die revolves freely with the work. The lathe is then reversed, and a clutch formed at the back of the sleeve is thrown in by the backward movement of the turret slide, and holds the die while it is being run off.

(76) J. F., Pottstown, Pa., writes: Please give a solution of the following problem; also explain the whys and wherefores of the conclusion you arrive at. Fig. 1 represents three forces acting on a point *C*, the magnitude of the force *C D* is 300 pounds, the direction in which the other two forces act is given by the lines *B C* and *A C*. What will be the stress at the point *C*, and at the point *E*? *A.*—We assume that these three forces are in equilibrium. Under these conditions, the forces *A C* and *B C* balance the force *C D*, and since the latter is equal to 300 pounds it follows that the pressure at *C* will also be 300 pounds. The magnitude of the forces *A C* and *B C* are found by the principle of the parallelogram of forces, thus: Draw the line *c f* (Fig. 2) parallel to *C D*; since *C D* represents a force of 300 pounds, the length of *c f* must be made to represent that amount; hence, if we adopt 100 pounds per inch, the line *c f* must be made 3 inches long. Through the point *c* draw the lines *b c* and *a c* parallel to *B C* and *A C*; through *f* draw *f b* parallel to *a c*; and *f a* parallel to *b c*, which completes the parallelogram of forces *a b c f*. The length of the side *b c* represents the magnitude of the force *B C*; and *a c*, the magnitude of the force *A C*. Measuring these lines we find each to be 1.6 inch long, and since we have adopted 100 pounds to the inch, each of the sides *b c* and *a c* will represent a force of $1.6 \times 100 = 160$ pounds, and this is the magnitude of the force *B C* or *A C*. The stress at the point *E* or any other points on these lines will be 160 pounds. The principle of the parallelogram of forces has been explained in an article treating on Stress in Structures, in our issue of April 10, 1890.



(77) G W. B., ——, asks: 1. If you had a piece of wrought-iron 4″ square, 25″ long, and wished to insert a 2″ steel shaft in each end to the depth of 7″, how would you do it? Would you shrink or drive them in? If you shrink them in, how much larger would you make the shafts than the holes? I tried it by shrinking, allowing just daylight between the calipers, but the cold shaft seemed to expand the hot hole, so that I had nothing but a snug fit. I made the 4″ square iron red hot. Would black hot have been better? *A.*—We should prefer to shrink them in, and should allow .005″ to .006″ for expansion. .001″ can easily be seen between the points; of calipers, and it may be that you did not allow enough. If a micrometer caliper were available we should measure the allowance by it, but if not then we would fit about the same as for a tight driving fit, and would not heat the square piece so hot. Considerably short of a red heat is plenty hot enough (if the proper allowance is made) to get the pieces in easily, and a higher heat than this is a disadvantage. 2. In one of your issues during last year, in the course of a description of an engine built at a Cincinnati school, you say that the pillow blocks are babbitted so that the shrinkage of the babbitt will tighten it in the block. How is that done? *A.*—It was done in this case by leaving the space to be filled by the babbitt in such a form that heavy flanges were formed at each end, and at intervals around the outside there were straight ribs running from one of these flanges to the other. The shrinkage lengthwise of these ribs is calculated to draw the heavy flanges hard against the pillow block casting. 3. Why could not the advertising sheets of your paper be so arranged as to admit of their being torn off when one wished to have the paper bound, thereby greatly reducing the bulk of the book? *A.*—They could be so arranged, but it is not thought best by the publishers to do so. There is no physical reason, however, why they cannot be taken off as at present arranged.

(78) G. K., Winnipeg, Minn., sends us rough sketches of two traction engines. Each engine has one driving axle, which is placed at the bottom of the rear end of the boiler, and the front end of the boiler is supported by a two-wheeled truck. The cylinder is placed horizontally on top of boiler, and motion is transmitted to the driving wheels by a train of gearing. The difference between the two designs is simply in the gearing and position of the crank-shaft; all the other parts are alike. In No. 1 design the intermediate gearing lies in a vertical line through the driving axle, and with the crank-shaft very close to the rear end of the boiler. In No. 2 design the intermediate gearing is placed forward of the driving wheels with the crank-shaft in the center of the boiler. Our correspondent asks: What effect will the gearing have in raising or pressing downwards the front end of the boiler? A friend of mine claims that No. 1 engine will depress the front end, and No. 2 will raise the front end when the engines are working hard. Now, I think that both engines will tend to lift the front end when running up an incline. I have seen No. 2 engine when stuck in a hole, lift the front end of the boiler with its front truck wheels clean off the ground several feet high, but I suppose that No. 1 boiler being much longer and heavier, the gearing will not have the power to raise the front end. Kindly settle this point. *A.*—You are nearer correct than your friend; in fact, you would have been entirely correct, if you had taken into account the ratio of the speed of crank-shaft to that of the driving wheels. If the distances from the center of gravity of the engines to their driving axles are equal, and the vertical distances from the driving axles to the axis of the cylinders are also equal, and both engines geared to run at the same speed, then the tendency to lift or depress the front end will be the same in both cases. The tendency to lift will always occur in both engines, but only when they are run in one direction, and depression at the front end will occur when they are run in an opposite direction. If the length of the boiler in No. 1 design is increased, its weight and the leverage with which it acts will also be increased, and consequently the tendency of lifting the front end will be decreased. The same remarks apply to No. 2 engine. That No. 2 should lift its front end as you have seen it do is quite possible, particularly when running up a hill, because then the weight on the truck will be decreased, and the tendency to lift will be greater; but the same thing may occur to No. 1 engine, if not properly designed. The tendency to lift may also be increased or decreased by changing the relative speeds of the driving wheels and crank-shaft.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.

Grant's (1891) gear catalogue ready. See adv. p. 20

Link-Belting and Sprocket Wheels.
Send for Catalogue of Link-Belting.
Over 50,000,000 feet of Link-Belt in use.
Link-Belt Engineering Co., Philadelphia and N. Y.

Shafting Straighteners. J. H. Wells, Tampa, Fla.

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The Improved Justice Hammer. Williams, White & Co., Moline, Ill., manufacturers.

Pattern and Brand Letters. A variety of sizes and styles. Heber Wells, 8 Spruce St., New York.

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The best Upright Hammers run by belt are made by Jenkins & Lingle, Bellefonte, Pa.

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Get particulars of our new Wall, Suspended and Radial Drills. C. H. Baush & Sons, Holyoke, Mass.

Selden Packing for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt St., N. Y.

Valve Seat Rotary Planing Machine. Pedrick & Ayer, Philadelphia, Pa.

Cylinder Boring and Facing Machines. Pedrick & Ayer, Philadelphia, Pa.

Light Special Machinery and Tools to order. The Meriden Machine Tool Co., Meriden, Conn.

For a knowledge of blue printing write to D. R. Miller, architect, Harrisburg, Pa.

I. S. L. drawing stands. The original. For particulars and prices, address W. S. Rogers, Troy, N. Y.

Castings for small and medium-sized vertical engines. Humphrey's Foundry, Bellefontaine, Ohio.

Send to H. W. Knight & Son, Seneca Falls, N. Y., for catalogue of pattern letters and figures.

Audubon Machine Works, New Haven, Conn. Electrical work, superior facilities, builders of machinery, heavy and light.

Guild & Garrison, Brooklyn, N. Y., manufacture steam pumps, vacuum pumps, vacuum apparatus, air pumps, acid blowers, filter press pumps, etc.

For the Latest Improved Diamond Prospecting Drill, address the M. C. Bullock Mfg. Co., 138 Jackson St., Chicago, Ill.

S. W. Card & Co., Mansfield, Mass., make everything in the line of Taps and Dies. S. A. Smith, 23 S. Canal St., Chicago, Western Agent.

Billings & Spencer Co.'s Packer & Boiler Ratchet, and all kinds of Forged Wrenches. S. A. Smith, 23 S. Canal St., Chicago, Western representative.

The I X L Drawing Table. Patented, in use everywhere. Beware of bogus copies. Jones & Mack, Cincinnati, O.

Complete sets of detail drawings for milling machines, radial drills, upright drills, lathes, etc.; all new designs. Jones & Mack, Cincinnati, O.

For the latest improved Eccentric Hook, Connecting Rods and Stub Ends, address T. C. Dill Machine Company, Philadelphia, Pa.

Hawkins' Calculations, for engineers, firemen and machinists. Send 25 cents for Part I, and subscription blank for whole issue, 10 parts (bound vol. $2.50). Theo. Audel & Co., 91 Liberty St., office 3.

25″ 32″ 37″ 42″ "Only Drill Press built on 'Ko-rekt' principles, even if they come from Jersey." Gould & Eberhardt, New Ark, N. J.

Patent Attorney R. G. DuBois, 715 11th Street, Washington, D. C., procures 1st-class patents for inventors. Send for pamphlet. Guaranteed by Rand, McNally & Co., of Chicago.

Patent Soliciting of High Class.
D. Walter Brown, Counsel in Patent Cases,
31 Nassau Street, New York.
Send for Brief History of Patent Legislation.

Every draftsman needs one. The Engineer's Sketch Book of mechanical movements, appliances, devices, contrivances, etc., by T. W. Barber. 1,936 illustrations, 8vo. cloth, $3. Catalogue of books on mech. subjects free, E. & F. N. Spon, 12 Cortlandt St., New York.

De Lamater Screw Propeller Wheel made only by The Samuel L. Moore & Sons Co., Elizabethport, N. J., who have purchased from C. H. De Lamater & Co., New York, all their patterns, books of record, gauges, etc. Location and equipment well adapted for Heavy Steamship Repairs.

"Binders" for the American Machinist. Two styles, the "Common Sense," as heretofore sold by us, and mailed to any address at $1.00 each, and the "New Handy," mailed at 50c. each. The former has stiff board covers, while the latter has flexible covers with full page opening flat. Either will hold the entire 52 issues of any volume. American Machinist Publishing Co., 96 Fulton St., New York.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator and making all required calculations from the diagram, also the principles of economy in operating steam engines and current practice in testing engines and boilers. Price $2, postpaid. Published by John Wiley & Sons, 53 East 10th St., New York.

MANUFACTURES.

Clayton Stoner will build a machine shop at Birdsboro, Pa.

A 100-ton iron furnace is reported as to be built at Front Royal, Va.

Miller Bros. contemplate the erection of a foundry at Columbia, S. C.

It is reported that a paper mill is to be built at Barberton, Ohio.

It is stated that a rolling-mill will be constructed at Pulaski City, Va.

The Jenifer (Ala.) Iron Company will improve and enlarge its iron furnace.

A stock company will establish foundry and machine shops in Berryville, Va.

The Salem Iron Works, according to report, will erect new works at Salem, N. C.

P. W. Pooser and others will, it is stated, erect an iron foundry at Milledgeville, Ga.

The machine works of R. F. Divver, situated at Anderson, S. C., are being enlarged.

It is reported that big iron works will be located at Christy, Pa., near McKeesport, Pa.

J. W. Bookwalter will build boiler works at Springfield, Ohio, to employ 400 men.

E. M. Cross, of Berlin, N. H., is building a foundry in connection with his machine shop.

There is talk of a stock company being organized to erect the ice factory at Athens, Ga.

A company has been organized to build and operate an ice factory at Shelbyville, Ky.

A stock company will, it is stated, be organized to erect a cotton-mill at Cherryville, N. C.

The Smith-Hill Company, Quincy, Ill., will build an addition to their extensive machine shops.

The Woodcock Iron Works has been incorporated at Goshen, Va., with a capital stock of $20,000.

It is stated that Berwick (Pa.) Car Works contemplate removing their plant to Bristol, Tenn.

R. J. Crous will build a $12,000 foundry at Greenwood avenue and Seventy-second street, Chicago.

The Galveston (Tex.) City Street Railway Company is to erect an electric power plant 120x84 feet.

An iron foundry and machine shop will, it is reported, be established at Corpus Christi, Texas.

The South Baltimore Car Works, Baltimore, Md., will increase its capital stock from $200,000 to $300,000.

The Union Steel Works, of Louisville, Ky., is reported as to remove its steel tool works to Lexington, Va.

The Georgia, Carolina & Northern Railroad Company proposes to build machine car shops at Abbeville, S. C.

Princeton, Ind., has voted $66,000 in bonds to secure the shops of the Louisville, Evansville & St. Louis road.

The A. K. Rung Company's machine shops at Buena Vista, Va., are nearly ready to receive the machinery.

The Argonaut Cotton-mill Company, Covington, Ky., are to place $100,000 worth of new machinery in their mill.

The Arcade File Works, now located at Sing Sing, N. Y., propose enlarging the works to double their capacity.

A company is being organized at Cheraw, S. C., by H. L. Laughlin and others, to establish a $100,000 cotton factory.

George Baring and Oscar White are erecting and will operate an iron foundry and nail factory at St. John, N. B.

A bill has been introduced in the legislature to incorporate the Leaksville Aluminum Company at Leaksville, N. C.

The Curtis Hardware Company is a new incorporated concern at Wellington, Kan., with a capital stock of $30,000.

The Nicholson & Waterman Mfg. Co., Providence, R. I., are extremely busy at their shops, and are employing 80 men.

Enderline & Beronio will, it is stated, rebuild their iron foundry and machine shops at Aberdeen, Miss., lately burned.

The Decatur (Ala.) Ice Company has increased its capital stock to $30,000 for the purpose of erecting a more ample plant.

The Richmond (Va.) Locomotive and Machine Works will rebuild at once their boiler shop, which was recently burned.

W. H. Phillips, of Taunton, Mass., will, it is stated, probably remove his foundry and machine shops to Middlesborough, Ky.

The subject of organizing a company to erect and operate an iron furnace is being energetically agitated at Minneola, Tex.

The Shenandoah Brass & Iron Works, of Charleston, W. Va., have let the contract for the erection of the buildings for its plant.

A stock company is being organized, it is reported, to erect a cotton-mill at Salisbury, N. C. M. J. Murdoch can give information.

The Moulton Heights Land Improvement and Industrial Company will, it is reported, erect a cotton-mill at New Decatur, Ala.

A $250,000 cotton factory is reported as to be erected in the Saluda valley, near Columbia, S. C. J. T. Sloan can give information.

The Hazen Company, of Anderson, Ind., is now erecting an immense nail plant and contemplates the erection of a steel billet plant.

The Houston & Texas Central Railroad Company will, it is reported, locate machine shops and roundhouse at Ennis, Tex., to cost $500,000.

Extensive improvements to the Clifton Forge shops of the Chesapeake & Ohio are comtemplated, as well as additional new machinery.

The Houston & Texas Central Railroad Company will, it is reported, locate machine shops and roundhouse at Ennis, Texas, to cost $500,000.

It is stated that a $100,000 cotton factory, pipe works, rolling-mill and other manufacturing industries will be established at Renfroe, Ala.

The Clover Cotton Manufacturing Company will, it is stated, put new machinery in and increase the capacity of its cotton-mill at Clover, S. C.

The Williston & Knight Ivory Button Company will move their industry from Bridgeport, Conn., to Eastham, Mass., and will employ 150 hands.

Columbia (S. C.) is to have a $500,000 cotton factory. The new Development Company, recently organized in that city, is behind the enterprise.

W. A. Cook, W. C. Foster and F. H. Owens have incorporated the Foster Hardware Company at Little Rock, Ark., with a capital stock of $75,000.

The Tampa (Fla.) machine works have moved into their new and commodious building, which is opposite the new depot of the South Florida Railroad.

Charles Tyler, of Baltimore, Md., has purchased, it is reported, and will operate the "Hope" iron foundry and machine shop at Fredericksburg, Va.

The city will endeavor to induce the Missouri, Kansas & Texas Railway Co. (office, Parsons, Kan.) to move its Alvarado machine shops to Waco, Tex.

The Warwick Machine Company has been organized at Augusta, Ga., and will erect large machine shops. Work will begin at once on the buildings.

The International Telegraph District and Construction Company, Baltimore, Md., will, it is stated, put new machinery in and enlarge its electric light plant.

S. W. Skinner & Co., Wilmington, N. C., operating machine shops, have incorporated as the S. W. Skinner Co., with a capital stock of not more than $200,000.

A company with a capital stock of $100,000 are stated to be preparing to establish at Renfro, Ala., a rolling-mill, pipe works and other industrial enterprises.

The Stevens Electric Company, of Birmingham, Ala., will put in additional machinery in its electric light plant, and its capital stock has been increased to $50,000.

The manufacturer of a storage battery for street cars is negotiating for the old works of the Brayton Petroleum Engine Company, at East Bridgewater, Mass.

At Richmond, Va., the James River Steel and Iron Company, to have a capital stock of not less than $200,000, and not more than $1,000,000, has been incorporated.

The Paragon Manufacturing Company will probably increase its capital stock to $100,000, for the purpose of doubling the capacity of its cotton-mill at Columbus, Ga.

W. H. Moffett & Co., Rushville, Ind., machinists and dealers in brass goods, iron pipe, natural gas fixtures, etc., will increase their facilities by the erection of new buildings.

The Cincinnati Screw and Tap Company have secured a location in the Fairmount Valley, one of the suburbs of Cincinnati, and have broken ground for a large factory building.

John W. Chesire & Sons have recently purchased the foundry and machine shops of Gravely & McCabe, at Martinsville, Va., and will enlarge and improve the plant at an early date.

T. T. Hillman, G. L. Morris and W. A. Walker will petition the legislature to incorporate the Southern Steel Company, to operate the steel plant to be erected at Birmingham, Ala.

It is probable that in the near future the Chicago Tire and Spring Company, of Melrose, Ill., which employs less than 100 men, will be so enlarged as to furnish employment to 500 persons.

The Safety Barb Wire Company, of Toronto, Can., are desirous of starting a plant in Denver, to cost $250,000. The manager is Mr. E. A. Beers, who is in correspondence with Denver parties.

W. J. Williams, of Dallas, Jacob Schuehle, of San Antonio, and others have, it is stated, organized the stock company to erect an ice factory at Dublin, Texas. The capital stock is $20,000.

The Quebec Machine and Foundry Company, with headquarters at the city of Quebec, is to be incorporated, with a capital stock of $30,000, to carry on the business of iron founders, machinists, etc.

It is stated at Charleston, S. C., that a company with a capital stock of $35,000 has been organized to establish a sheet-lead mill, which will be the first enterprise of this kind south of Baltimore, Md.

A new nail company, with a capital stock of $100,000, has been organized at Seattle, Wash., by George Gray, formerly foreman in the works of the Pacific Iron and Nail Company, at Oakland, Cal.

It is stated that the Fredericksburg Development Company has closed contract with the Progress Engine and Machine Works, of Summerfield, Md., for the removal of its plant to Fredericksburg, Va.

The Ball & Wood Company, of Elizabeth, has been chartered by the Secretary of State of New Jersey, to manufacture and sell steam engines. The capital stock is $3,000,000, of which $100,000 is paid up.

The Bristol Foundry and Machine Company has been organized by H. T. Farnsworth, and is now erecting buildings for its foundry and machine works at Bristol, Tenn. The capital stock is $100,000.

Rockford, Ill., is figuring for the removal to that city of the Standard Foundry and Manufacturing Company, of Cleveland, Ohio, which gives employment to 250 men, and daily melts 20,000 pounds of iron.

The Patten Self-oiling Journal Company, with a capital stock of $100,000, have been incorporated at Baltimore, Md., by J. S. Patten, Edwin Higgins, J. A. Pierce and others, and will establish axle works.

The Tallapoosa (Ga.) Furnace Company is to erect another stack, 11x60 feet, enlarge the cast-house and put in additional machinery, making the plant a twin furnace with an annual capacity of 25,000 tons.

Northern capitalists have purchased the old factory near Carrollton, Miss., and will operate it under the name of the Delta Cotton and Woolen-mills and Land Company. They have a paid-up capital of $1,000,000.

The Midway Iron Company, previously reported, has erected its plant at Roanoke, Va. The spike department is 70x160 feet, and the cooper shop 20x50. Railroad spikes, nails and other small irons will be manufactured.

The Chicago and Erie Company will erect at Huntington, Ind., a building 250 feet long by seventy-five feet wide, in which to do car repairing. This will increase their force of shop hands at that point about 100 men.

There is water-works agitation in Millerton, N. Y.; Berlin, N. H.; Hoquiam, Wash.; Birmingham, Conn.; Forest Grove, Oregon; Oakland, Neb.; Manchester, Mass.; Holland, N. Y.; Sacramento, Cal.; Cherry Creek, N. Y.

The Watt Mining Car Wheel Company, of Barnesville, O., will, the coming spring, erect a new plant for their foundry and machine works. The buildings will be of iron, and will materially increase the capacity of the company.

The Synnestvedt Machine Company has been formed at Chicago, capital stock $3,000, for the manufacture of machinery and mechanical appliances. Incorporators, John B. Synnestvedt, Oscar F. Linroth and Hugh L. Burham.

The contract for the erection of the wire-mill to be established by the Pittsburgh Wire Company, on the Monongahela River, at Braddock, Pa., has been given out, and work on the projected plant will be commenced at the earliest possible date.

It is stated that a $5,000,000 stock company has been organized in New York, for the purpose of promoting the establishment of manufacturing enterprises in Marion, N. C. Iron works, woodworking factories, etc., are already projected.

The Arkansas Coal and Ice Company, Little Rock, Ark., recently incorporated with a $30,000 capital stock, has purchased a 2½-acre tract of land from G. W. Clark, on which it will erect an ice factory. The secretary of the company is R. H. McNair.

The Jones Positive Nut Lock Company, of Chicago, has been incorporated, with capital stock of $100,000, for the manufacture of safety nut locks and other railroad specialties; incorporators, Thomas D. Jones, Charles D. Anderson and Joseph Dirschmidt.

The Lacroix Automatic Car Wheel Company has been organized at Chicago, for the manufacture of automatic car wheels and other running gear for railroad cars; capital stock, $1,000,000; incorporators, Frank H. Cooper, John A. Lacroix and Augustus Biswanger.

The Herrick Manufacturing Company have been incorporated at Syracuse, N. Y., by George S. Herrick and associates, with a capital stock of $25,000, for the purpose of manufacturing feed regulators and other appurtenances connected with steam pumps.

The Burden Iron Company have placed an order with the Yale & Towne Manufacturing Company, Stamford, Conn., for 100 triplex chain blocks. It is claimed that with this block fully four-fifths of the exertion of the operator is utilized. It is coming into very general favor.

Palmer, Cunningham & Co., Philadelphia, Pa., write us that they have ceased making the "Indispensable Lathe Dog" (illustrated in our edition of Nov. 27, 1890) of steel castings, and are now drop-forging them from bar steel; this without any increase in price. Orders for these dogs are large and increasing.

The Chicago Investment and Construction Company has been incorporated in Illinois, with headquarters at Chicago, to construct railroads, warehouses, elevators, canals, docks, rolling-mills, blast furnaces, machine shops, etc. Capital stock, $1,000,000. Incorporators, Henry S. Waldron, George W. Lewis and Leroy Armstrong.

The contemplated erection, in the spring, of an addition to the new mill built last season by the Amoskeag Company, upon the west side of the river at Manchester, N. H., will make the longest mill structure in Manchester, if not in the United States. This mill is run wholly by steam for motive power, and will be nearly 1,000 feet long.

There is a report that the Dexter Machine Company may revive its operations in Dexter (Me.) at no late date, and the people of the town are all hoping that this may prove true. Dexter is too smart a place to be obliged to wait long for the establishment of new industries. The people are ready to welcome new enterprises with open hands.

The Wagner palace car shops, at Buffalo, N. Y., are to be enlarged by the erection of a new shop 140x458 feet, having accommodations for 23 tracks. The building is to be of brick and stone, and will cost about $60,000. Operations will begin at once, and it is expected to have the shop completed by July 1st, when the company will have 68 tracks under roof.

A charter of incorporation has been granted by the government of Ontario, Canada, to Cant Bros. & Co., of Galt, under the title of "The Cant Bros. Co., of Galt, Limited." The company will continue the manufacture of wood-working machinery. The capital stock is $40,000. The president is Andrew Cant, of Buffalo, and the secretary is A. Bisset-Thorn.

The Cleveland Twist Drill Company, Cleveland, Ohio, write us: "We beg to announce that we have moved our New York office from No. 101 Chambers street, to Nos. 100 and 102 Reade street, where we shall be pleased to see any of our patrons when in New York. We are carrying a very large line of Twist Drills and Reamers, and are prepared to fill all orders promptly."

Application has been made for a charter for the Adams Iron Company, of Pittsburgh. The incorporators are George D. Blair, T. S. Blair, Jr., R. W. Carroll, W. H. Miller and F. Protzman, Sr. The new company propose to engage in the manufacture of stock for crucible steel by the Adams direct process. As yet it has not been definitely decided where the plant will be located.

Barbour, Stockwell & Co., of Cambridge, Mass., manufacturers of street railway supplies, have in course of erection a machine shop, three stories in height and 150x52 feet in size, a foundry 175x75 feet, having a monitor roof, and a pattern shop 125 x52 feet. The different departments will be equipped with the most improved machinery, and the old works of the company abandoned.

Negotiations are now pending which may secure to the Cramps, of Philadelphia, the plant of the Standard Steel Casting Company at Thurlow, Pa. The Cramps want the works for heavy castings. The Standard has paid 33 per cent. dividends, and the stock, par $100, has sold for $203. It is considered one of the most successful steel plants in the country, and will prove quite an acquisition to the great plant owned by the Cramps.

Mr. J. W. Britton, of Cleveland, Ohio, has severed his connection with the Britton Iron and Steel Company, and has organized a new concern, under the name of the Britton Rolling-mill Company. New works have been built and equipped with the best machinery for the manufacture of soft steel sheets of fine quality. The works are excellently situated for rolling-mill purposes. The new firm announces that its tin plate and galvanizing works will be in operation by August 1st.

The Great Western Iron and Steel Works, successors to the Moss Bay Hematite Iron Steel Company, are building a foundry, machine shops, etc., at Kirkland, Wash. The company proposes to expend $1,000,000 the first year in the development of the enterprise, and will erect a large furnace, and later on a rolling-mill. Material is already on the ground for the building of large portions of the plant, and machinery and other equipment have been purchased and await shipment.

The Lake Steel and Iron Company have been chartered in South Carolina, with the following incorporators: M. M. Strauss, Leon Wallenstein, I. I. Strause, Ed. Whitlock, Louis Stein, A. H. Jacobs and Samuel Proskaner. The capital stock is not to be less than $100,000 nor more than $1,000,000, and the object of the company is to acquire real estate and to own and erect iron furnaces. A tract of iron ore lands near Yorkville, S. C., has been purchased, on which the company propose to build furnaces and steel works as soon as practicable.

The demand for the "Horton Lathe Chuck" has increased so rapidly of late that The E. Horton & Son Company, who make it, have been obliged to provide more room, in order to keep up with their orders, and to enable them to do this, they have bought the premises adjoining their own, of Messrs. A. W. Converse & Co., founders and machinists. This will give an additional frontage, and water power equal to their own, and more than double their facilities for turning out work. As heretofore, nothing but Horton chucks will be manufactured.

The Rosney Iron and Lumber Company, Limited, has been incorporated, with F. T. Shaw, of Westminster, Md., as president, Dr. J. H. Billingslea, of Maryland, as vice-president, and H. M. White, of Washington, D. C., secretary, for the purpose of building the new town of Rosney, Va., in Buckingham County, aiding in the establishment of manufacturing industries, etc. The following enterprises are already projected: Bessemer iron furnaces, steel plant, a 100-ton charcoal furnace, car wheel works, tool works, wagon factory and others. The company's capital stock is $1,000,000.

The Ryan & McDonald Manufacturing Company are engaged in the removal of their extensive works from Waterloo, N. Y., to Baltimore, Md., where they have erected a large building for their use. The new building, which is located on Curtis Bay, about six miles out from the city, is 350 feet long by 70 wide, and embraces under one roof the machine shop, boiler shop, smith shop and woodwork shop. The building is of corrugated iron. The offices of the company will be located at 44 South street, Baltimore. The old works at Waterloo will be used as a foundry for local purposes, large foundries being located adjoining the new works on Curtis Bay, which the company will utilize.

The National Association of Machinists.

At Atlanta, Ga., in May, 1888, T. W. Talbot and W. L. Dawley, with seventeen other machinists employed in that city at the time, met and organized an association, which was called the United Machinists and Mechanical Engineers of North America.

The objects of this association, and the principles by which it was to be governed, were set forth in the constitution, from which we gather the following statement regarding them.

The aim was to secure as members first-class machinists, men of intelligence and good moral character, who, in times of adversity, could be assisted without danger of encouraging evil habits, and who could be confidently recommended to discriminating employers in need of good machinists.

To render to these men all possible assistance in finding employment when in need of it; to establish a fund for the relief of sick and disabled members, and for the families of deceased members.

By the exchange of ideas and information pertaining to the business, to improve the qualities of members as mechanics, so that so far as possible it might be recognized that any member of the association is in every way worthy of his calling, and entitled to the best wages.

While strikes are not distinctly prohibited, it is opposed to the spirit of the organization to engage in them, and they are never to be resorted to except as the last resort, and after every other means of settling a difficulty has been tried in vain. On the contrary, it is made an especial object to cultivate the most friendly relations between the association and employers of machinists, and effort is made to overcome the prejudices which may exist on either side, and secure such treatment of each by the other as will be recognized as just, fair and right.

In order better to carry out the idea of assisting those members who may be out of work, in finding profitable employment as quickly as possible, and with the least possible outlay in traveling from place to place

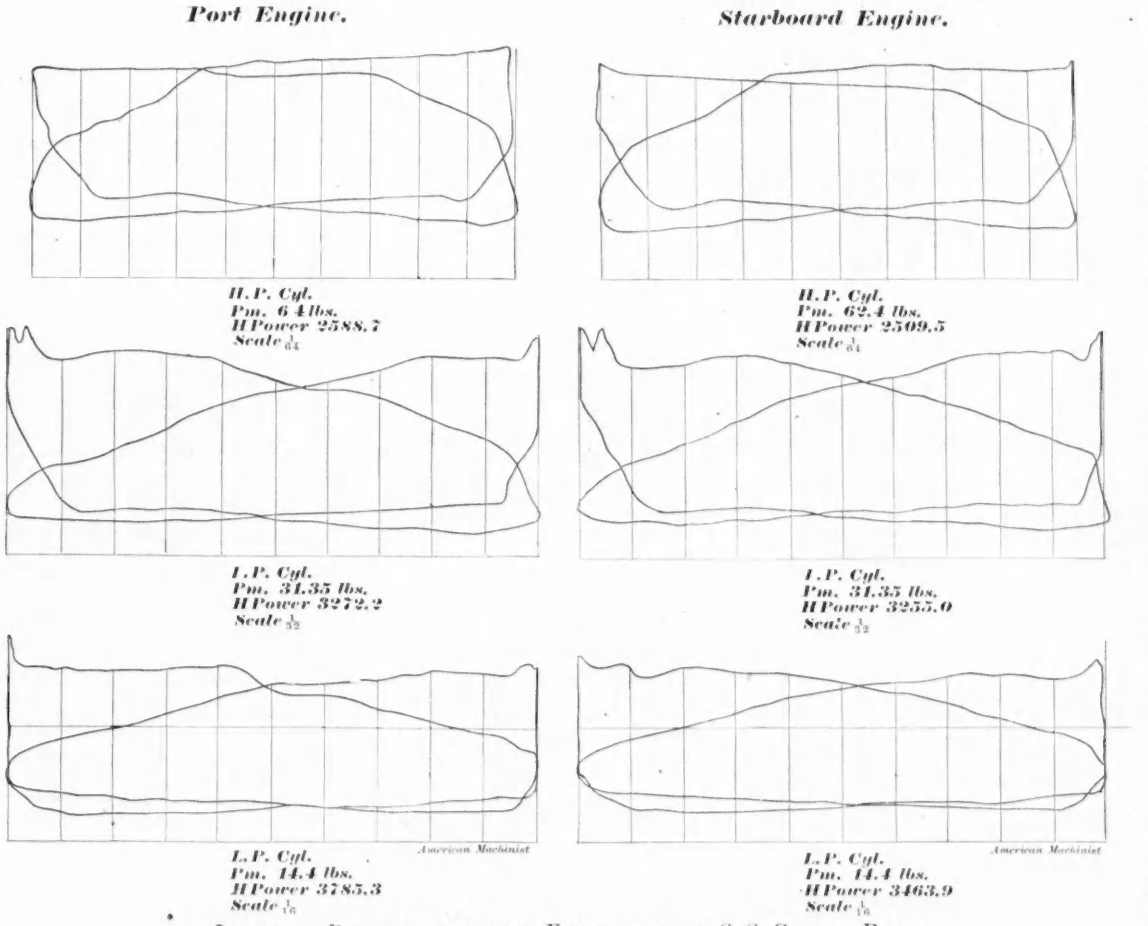
looking for work, a statistical bureau has been established, which is in charge of one of the general officers, reports being made to him monthly from each lodge of the organization by an officer appointed for that purpose, and called the statistician. These reports are designed to furnish detailed information as to the state of the trade in each locality, number of men employed, ruling rates of wages, and class of work done. By this means a member who is out of work can get information which will be of assistance to him in deciding where he will be most likely to find a situation suited to his abilities, if indeed he does not receive direct aid in securing it.

With these objects, and guided by these principles, the organization flourished, and in May, '89, representatives from thirty-four local organizations or lodges met in Atlanta and formed a grand lodge, at the same time changing the name of the organization to the National Association of Machinists. In May, '90, representatives from eighty-five lodges met in Louisville, selecting as the next place of meeting Pittsburgh, and the time the first Monday in May, '91.

On December 12, '90, there were 142 lodges, and a total membership of about 10,000. The headquarters of the association are in the Masonic Building, Richmond, Va., Mr. James J. Creamer being Grand Master Machinist, and Mr. W. L. Dawley, Grand Secretary.

A journal, called the *Monthly Journal of the National Association of Machinists*, is published under the direction of the grand officers, in which matters pertaining to the organization and to the business generally are discussed.

Those who make a study of such things assert that calamities come in groups. The recent mine explosions coming one after the other in rapid succession, seem to uphold this theory. Still it might be well enough to investigate the cause of these explosions, and to remove it, if possible. According to the theory of succession, if the first explosion did not occur the others would not follow. Better stop the first one.



INDICATOR DIAGRAMS FROM THE ENGINES OF THE S. S. CITY OF PARIS.

Some Rolling-mill Notes.

BY C. O. SINE.

From the rough, dirty and generally uninviting appearance of a rolling-mill roll lathe the average machinist, especially if he had never seen one before, would not call it a lathe at all, but a "scrap heap," or some other derisive name, such as is bestowed on the oldest lathe in a machine shop. They are nearly always placed in the meanest, darkest corner of the mill—in space that could not be used for anything else, yet a roll lathe and a roll turner are of the first importance in a mill. Roll lathes are much heavier and more powerfully geared than engine lathes. There is nothing automatic about them; no "soldies" on these machines. The top of the bed-plate is flat, and each side cored full of holes like a planer table. The tail-stock and housings are not only clamped to the bed-plate, as the tail-stock is on engine lathes, but are also stubbed in position. The centers are only used in necking the roll, the body being turned while running on the necks in the housings. The tools used in roll turning are supported by a rest, which is simply a table clamped and stubbed to the bed, and of such height as to bring the top of the tool to the center of the roll. The top of the rest is cored full of holes and slots, which the turner uses in clamping, wedging and feeding his tools in any direction.

For turning sheet rolls the tool used is simply a piece of one and a half-inch square steel from three to six inches long, grooved out on the sides to make easier grinding, then tempered as hard as possible, ground and fed into the roll with a set-screw. The rest is always as close to the roll as it can be used, thus giving the tool all the foundation there is to be had. As soon as a place on the roll is rounded up the tool is backed out, slipped along the length of itself, and fed in again, and so on till the roll is roughed all over. The smallest diameter is now found with calipers, and the larger diameters are turned down, making the roll about straight. So far no mentionable skill has been required; only patience and grinding, for about four days have been used up in skelping the surface of a chilled roll four feet long and two feet in diameter.

The turner now draws a line on the face of the roll from end to end, parallel with the center. The roll is to be turned so a straight-edge will touch over the entire face of the roll when applied, so that it crosses this line at the center, and at the ends of the roll the straight-edge will be two inches from the line at one side on one end, and the same distance to the other side at the other end.

When the roll is put to work in the mill the middle gets hotter than the ends, and, in consequence, the expansion makes it a plain, straight cylinder, making the iron rolled of a uniform thickness. The amount to be allowed for expansion varies with the width of iron to be rolled, etc. It is in turning the roll to fit the straight-edge where the skill of the roller is apparent. The feed is so light in finishing that one's breath on the roll will stop the cut. Rolls are not always turned as perfectly as the one referred to, for roll turners are like machinists, viz., some can, and some cannot work real closely.

Having a curiosity to know how thin iron or steel could be rolled, and how it was done, I put the question to our sheet roller, who replied that he had seen iron rolled so thin that it took at least ten thousand sheets to make an inch in thickness. The iron is doubled, and a great many sheets rolled at a time—when very thin the sheets will not bear separation. When held up, light may be seen through them, and when held to the flame of a lamp they will burn like paper. Of course, such iron is of no practical use, and only made to see what can be done.

For turning shapes, such as angles, channels, Ts, etc., the roll turner is furnished with templates for each pass, and a drawing of the rolls. He makes tools to fit his templates, then puts the tools in till the diameter required is reached. When one roll is done it is laid aside till its mate is roughed out, when it is put on top of the one being roughed in the lathe, and matched so the template will fit the passes. Such rolls are not chilled. The skill in turning such rolls is much less than that required to turn a sheet roll as described. Journeymen roll turners' pay is three dollars per day, but the boss roll turner, who can design rolls for shapes with ordinary certainty that they will work, can get from two to five thousand dollars per year, or he can take the job by contract, and make more. I do not know of any men who pretend to work that make so much money as boss roll turners do, who do so little. A draftsman will do three times the work for one-third the pay.

A roll turner does not use paint on his straight-edge in marking the high places on the roll, but uses hard chalk instead. The chalk marks the roll equally as well, and does not interfere with the cutting of the tool as paint would. It is just as easily applied, is much cleaner, and I see no reason why machinists could not use it occasionally to advantage. But very little of the chalk adheres to the straight-edge, and, consequently, cannot be put on too thick.

Dry grindstones are always used by roll turners. Emery wheels are used occasionally for grinding tools for shape work, but for general grinding the dry stone is the favorite. They will glaze over on short notice, but by using a little appliance known as a "scraper," the active cutting qualities of the stone are soon revived.

A description of the scraper may not be amiss, so I give it. It consists of a small carriage that fits in a groove in the plate in front of the stone. A piece of steel about four inches wide and one-sixteenth thick is held in the carriage just as a tool is held in a lathe, except that it is held flatwise. The steel projects through the slot in the end of the carriage next the stone. The slot allows the steel to vibrate about three-eighths of an inch. The scraper is pushed across the face of the stone with one hand, while the steel is fed up to the stone as it is worn off with the other. The vibration of the steel cuts shallow furrows over the face of the stone, and keeps the stone true, besides making a "horrid noise" and raising a cloud of dust. A stone four feet in diameter is a good size, and one hundred and ninety turns a minute is a good speed.

The Performance of Engines on the S. S. City of Paris.

The performance of the engines on S. S. City of Paris, and accompanying indicator diagrams, which, we believe, are here published for the first time, will undoubtedly be of interest to many of our readers. The diagrams have been reduced to ⅜ from the original size. The given scales are those of the original cards; hence to measure these diagrams a scale ⅜ of that given should be adopted. We also append abstracts of log taken during the fastest passage of the steamer:

S. S. "CITY OF PARIS."

Diameter of cylinder, H. P.	45"
" " " I. P.	71"
" " " L. P.	113"
Area of grate surface	1,294 sq. ft.
Area of heating surface	50,250 sq. ft.
Area of cooling surface	33,000 sq. ft.

RATIOS.

Heating to grate surface	38.8:1
Heating to condenser surface	1.52:1
Stroke (common)	60"

Ratios of cylinders:

H. P.	I. P.	L. P.
1	2.489	6.304
	1	2.53

2.489: 2.53:: 1:1.017.

PERFORMANCE, JULY 29, '89.

	Port.	Starboard.
Steam	148	148
Revolutions	87	86.5
Vacuum	26	26
Cut-off, H. P.	full	full
Cut-off, I. P.	full	full
Cut-off, L. P.	full	full
Mean pressure, H. P.	64	62.4
Mean pressure, I. P.	31.35	31.35
Mean pressure, L. P.	14.4	14.4
Indicated horse-power, H. P.	2,588.7	2,509.5
Indicated horse-power, I. P.	3,272.2	3,255.0
Indicated horse-power, L. P.	3,785.3	3,763.9
Total indicated horse-power for one engine	9,646.2	9,528.4
Total indicated horse-power for two engines		19,174.6
Temperature of feed water		119°
Temperature of sea water		54°
Lbs. of water per I. H. P., H. P.	11.42	*10.25
Lbs. of water per I. H. P., I. P.	13.1	13.87
Lbs. of water per I. H. P., L. P.	11.74	12.42
I. H. P. per revolution	110.84	110.1
I. H. P. per square foot of grate		14.82
I. H. P. per square foot of heating surface, $\frac{1}{2.62}$ or 2.62 sq. ft. H. S. per I. H. P.		
I. H. P. per square foot of condensing surface, $\frac{1}{1.72}$ or 1.72 sq. ft. C. S. per I. H. P.		
Clearance, calculated from compression curve, H. P., 17.9; I. P., 8.25; L. P., 7.4 per cent.		
No. of cu. ft. swept per minute per I. H. P., by L. P. piston	6.28	6.32
Mean pressures referred to L. P. Piston	36.89	36.69

*From Ind. Cards. No allowance for heat into work or condensation.

ABSTRACT OF LOG.

Date.	Wind.	Distance.	Lat.	Long.	Remarks.
1889.					
May 2	Variable.	...	.....	.....	Left Queenstown at 1.43 P. M.
" 3	W. N. W.	445	50.58	19.45	Strong breeze to gale.
" 4	N. W.	492	49.24	32.16	Fresh breeze.
" 5	N.W. to W.S.W.	†504	45.38	43.22	Mod. to light breeze.
" 6	Variable.	†505	42.48	54.06	Mod. to light breeze.
" 7	Variable.	†511	41.11	65.21	Light breeze.
" 8	Variable.	398	Sandy Hook		Arr. at Light Ship at 8.15 A. M.

Passage, 5 days 23 hours and 7 minutes. Fastest on record.
†Longest day's run on record.

There seems at present to be something of an epidemic among our English technical exchanges, which leads them to criticism of things American in general. One of them, which for some time has been reprinting Mr. George B. Grant's articles on gearing, reproducing text and illustrations from our columns, without any credit to us whatever, and as though Mr. Grant had written the articles for it instead of the AMERICAN MA-

CHINIST, charges Americans with being unduly audacious because some naval officers are to be sent over there to learn what they can regarding English naval construction.

Another one of our able English contemporaries, in reviewing a new dictionary of American origin, calls the omission of the letter u in such words as color, favor, etc., and the spelling vise, instead of vice, when the familiar machine shop appliance is meant, "American barbarisms." The Encyclopedia Britannica, in its treatment of the subject of telescopes, shows for the Lick instrument the "proposed mounting" by Grub, of Dublin, and ignores the actual mounting as built by Warner & Swasey. Should this be called an English barbarism?

A woman in St. Joseph, Mo., has obtained a verdict of damages for the ruin of a dress owing to the fact that the rear car of a train had not pulled up to the platform on a rainy night, whereby she was compelled to step out in the mud.

The ice crop gathered on the Hudson this year beats the record of any previous year. This will give ample excuse for high prices next year; it costs so much to store the enormous crop, you know.

The cruiser "Newark" has been formally accepted by the government, and has gone into commission. Her performance is highly creditable to the builders, the Cramps.

Machinists' Supplies and Iron.

NEW YORK, February 7, 1891.

Iron—American Pig—The condition of the market seems generally uncertain, and things are thought to be in process of arrangement on a new basis. An organization of the iron producers of the Mahoning and Shenango Valleys has been effected, which is to take the place of the Mahoning Valley Iron Manufacturers' Association. It will be called the Mahoning and Shenango Valley Iron Manufacturers' Association, and it is thought will prove the strongest organization of iron manufacturers in this country. Over $7,000,000 investments will be represented in it. There are reports of the sale of one of the large blast furnaces to an English syndicate.

We quote No. 1 Foundry, standard Northern brands, $16.75 to $17.50; No. 2, $16 to $16.50; Gray Forge, $15 to $15.50; Southern brands No. 1 Foundry, $16.25 to $16.75; No. 2, $15.75 to $16.25; No. 3, $14.25 to $14.50.

Scotch Pig—The market continues dull.

We quote Coltness, $24.50; Dalmellington, $22 to $22.50, and Eglinton, $20.50.

Copper—The market is generally weak, and buyers seem to expect lower prices. Lake is held at 15c. by the companies, though outsiders continue to offer it at 14½c. Casting brands are held at 12c. Arizona Ingot, 13c.

Lead—The market is unsettled, and prices somewhat irregular, though not quotably changed, 4.40c. for car load lots.

Spelter—Values have declined to 5.10c., and buyers seem to expect still lower figures.

Tin—At the Metal Exchange there has been lively trading at values of about 19.75c. to 20c.

Antimony—The market is steady.

We quote Hallett's, 16¾c. to 16⅞c.; Cookson's, 18½c. to 18¾c.

Lard Oil—The market is dull, but prices so far are maintained at 49½c. to 50c. for Prime.

✲WANTED✲

"Situation and Help" Advertisements only inserted under this head. Rate 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Saturday morning for the ensuing week's issue.

Wanted—Position by young asst. mech. draftsman. Draftsman, 485 Henry st., B'klyn, N. Y.

Experienced mech. draftsman wants position. Reference. BOX 45, AM. MACHINIST.

Practical boiler maker wants situation as foreman or laying out work. Address T. 8, care Lord & Thomas, Chicago, Ill.

Draftsman—A young man, now employed as mechanical draftsman, desires out-door work; near Philadelphia preferred. Address Box 44, AM. MACH.

Position—By first-class tool maker and machinist (28); capable of getting up small machinery and tools. Tool Maker, AMERICAN MACHINIST.

First-class mechanical draftsman, good designer, technical education, experienced, wants situation to work on steam engines and general machinery. Address BOX 43, AMERICAN MACHINIST.

Wanted—Foreman pattern maker wishing to make a change, capable of working wood, brass and plaster (for core boxes); can give best of reference; valve work preferred. Address S., AMERICAN MACHINIST.

Wanted—A first-class machinist as foreman of our shop; must be temperate, steady and reliable; permanent work for the right kind of man. Address, with references, Dewey Bros., Goldsboro, N. C.

Wanted—A practical man familiar with designing and manufacturing duplex pumps and boiler feeders, as superintendent in a new factory to be started in Illinois. Address with refs., Duplex, AM. MACH.

Wanted—A number of first-class machinists to work on ice and refrigerating machinery, and stationary engines; good wages and steady work to first-class men. Address Frick Company, Waynesboro, Franklin County, Pa.

Position Wanted—A young mechanical engineer, experienced in inventing and designing automatic lab. sav. machinery for New Eng. m'f'g purposes; thoroughly posted in steam mach'y, electricity and mill engin'g; best ref. Address Kinetics, AM. MACH.

Wanted—Position as constructing engineer, chief draftsman or superintendent in a shipyard or establishment doing marine engineering work; advertiser is a graduate of one of the best technical high schools in Europe, and has had 17 years' experience. Has also had experience in building of stationary engines, pumps, etc. Box 39, AM. MACH.

Wanted—Parties in Canada to build and sell a newly invented and improved steam pump; patterns, castings and machinery furnished. Parties having capital to invest will find a good opening for a successful business. Nothing like this steam pump ever put on the market; it is very simple. For full particulars address C. M. M., AMERICAN MACHINIST.

✢ MISCELLANEOUS WANTS ✢

Advertisements will be inserted under this head at 15 cents per line, each insertion.

Cheap 2d hd lathes & planers. S. M. York, Clev'd, O.

Pratt & W., 6-spindle Drill. $275. York, Clev., O.

Just out: aluminum steel hack-saws, hard but not brittle. Crescent Mfg. Co., Cleveland, Ohio.

New catalogue of engineers' specialties free. Crescent Mfg. Co., Cleveland, Ohio.

Light and fine machinery to order; Foot Lathe Catalogue for stamp. E. O. Chase, Newark, N. J.

Correspondence solicited with parties having light machinery to build. Address D. T. C., AM. MACH.

Wanted—Customers for our new Radial Drills. C. H. Baush & Sons, Holyoke, Mass.

Wanted—Specialties for the Southern trade. Bluefield Iron Works, Bluefield, W. Va.

Engineers wanted to send their addresses and receive free a 25 cent book, "Hints and Suggestions for Steam Users." Lord & Co., P. O. Box 1262, Phila., Pa.

Wanted—To lease a small machine shop by 1st of April. Address F. P. Ebert, Box 237, Montrose, Susq. Co., Pa.

For Sale—A foundry and machine shop in a growing western town doing a good business; splendid chance for a molder and machinist with small capital. Address Box 38, AMERICAN MACHINIST.

Wanted—Engineers to write for catalogue of all the latest and most valuable mechanical, scientific and electrical books which are given free with each barrel of the Pittsburgh Boiler Scale Resolvent. Pittsburgh Boiler Scale Resolvent Co., Pittsb'gh, Pa.

Wanted Partnership—A mechanical engineer (machinist) will invest six thousand dollars ($6,000) for ½ or ⅓ interest in shop in any good city where we can also build a specialty in the character of engines; or might join a good mechanic with money in starting a shop. Best of experience and reference. Address Box 42, AMERICAN MACHINIST.

Sioux City Engine Works, Sioux City, Iowa, are anxious to ascertain the whereabouts of Stephen Roper, Mechanical Engineer, etc., and it will be to the interest of said Stephen Roper to write the Sioux City Engine Works, and advise them what his intentions are in regard to business transactions with them.

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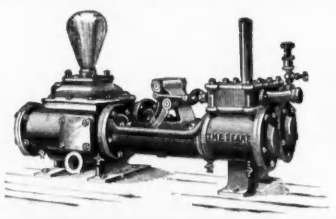

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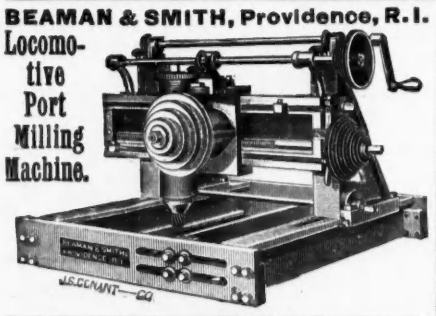

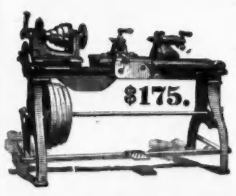

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Drill Presses, Shapers, Band, Circular and Scroll Saws. Machinists' Tools and Supplies. Lathes on trial. Catalogue mailed on application.

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FOR LAGGING LOCOMOTIVE BOILERS.

Samples and Descriptive Price List Free by Mail.

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Tensile Strength upwards of 79,000 lbs. per sq. in. Torsional Strength equal to the best Machinery Steel. Anti-Frictional and Non-Corrosive

CAN BE FORGED HOT.

Round, square, and hexagon bars for pump, piston rods, bolts and screws. Yacht shafting. Rolled sheets and plates for pump linings and condenser tube sheets, &c. Spring wire.

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200 page Catalogue sent on mention of this Journal, by

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For Boiler Dampers. For Pumps and Pumping Engines. Damper or Pump Regulator.

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MACHINE WORK

OF ANY DESCRIPTION TO ORDER OR BY CONTRACT.

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FINE TAPS, DIES, REAMERS, Etc.

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Bolt Cutters, Hand and Power Drilling Machines, Punching Presses, Tire Benders, Tire Upsetters and Other Labor-Saving Tools. Send for Price List.

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BUILDERS OF EVERY VARIETY OF

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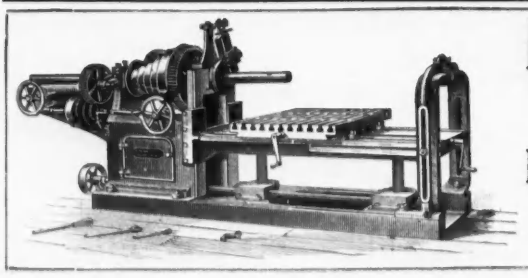

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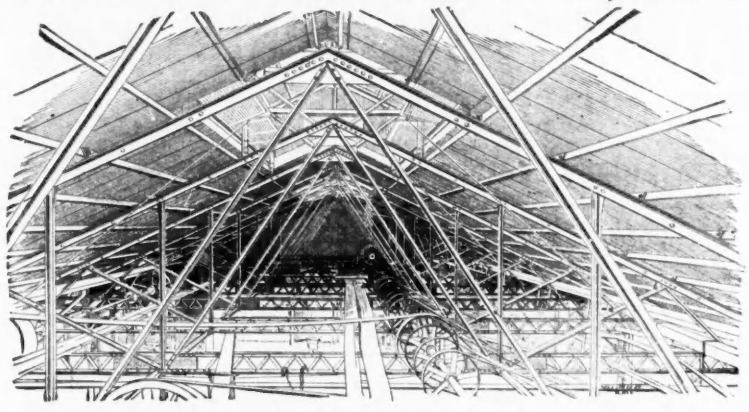

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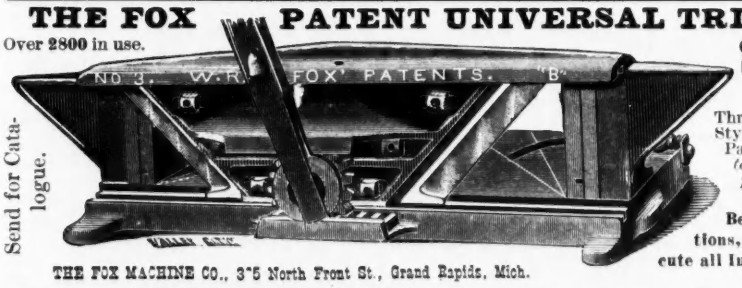

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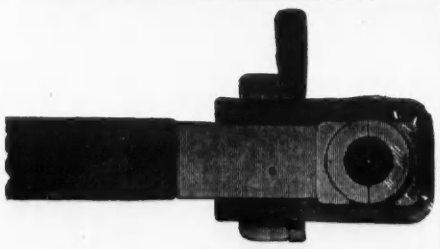

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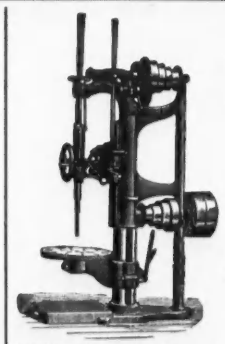

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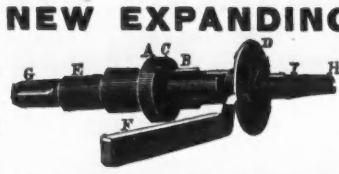

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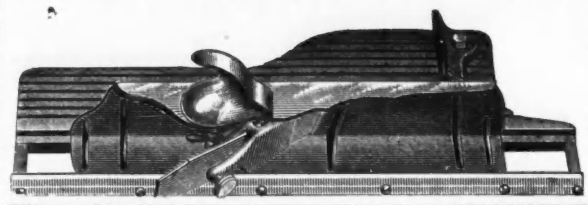

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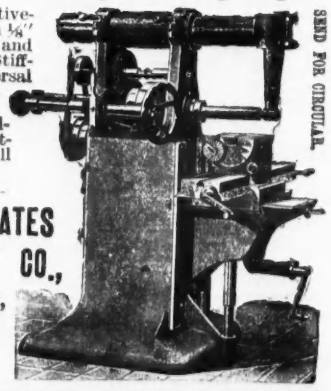

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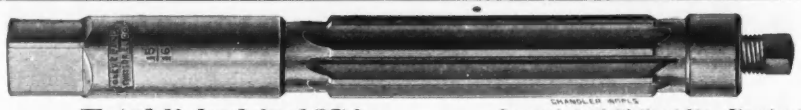

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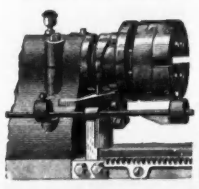

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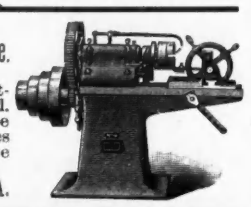

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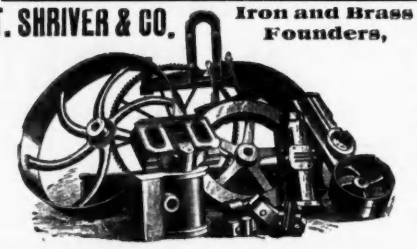

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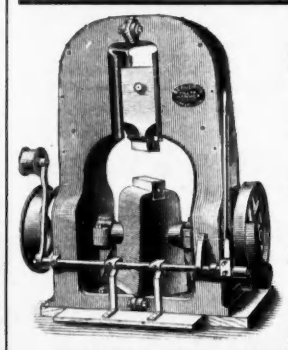

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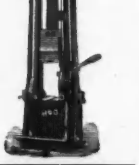

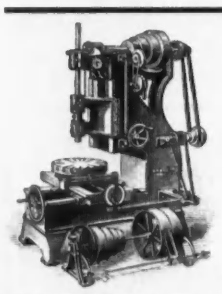

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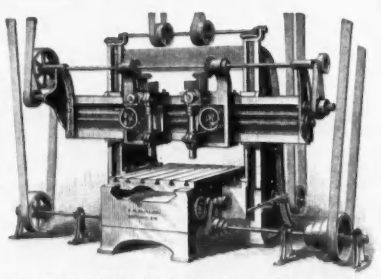

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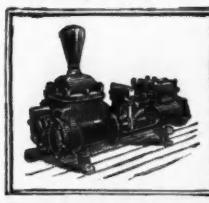

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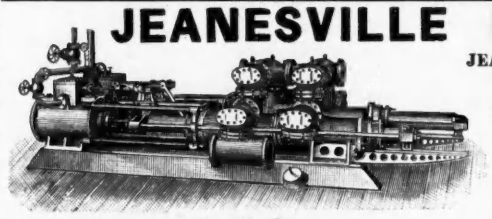

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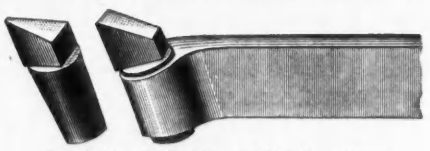

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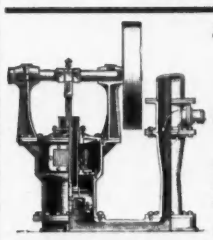

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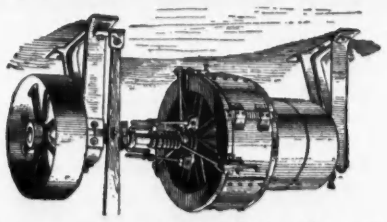

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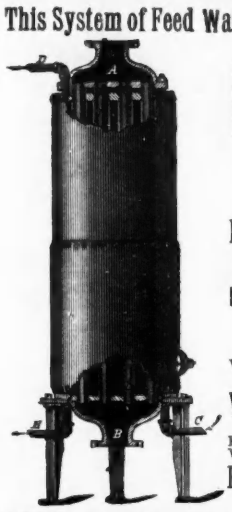

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With reliable provision for expansion, and will

HEAT AND PURIFY THE WATER

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Wear the Longest.

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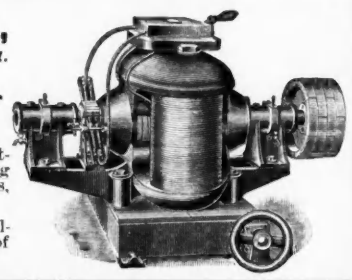

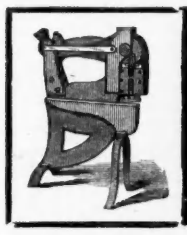

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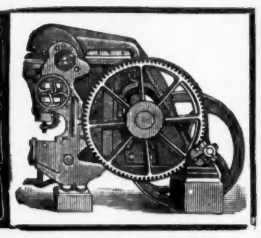

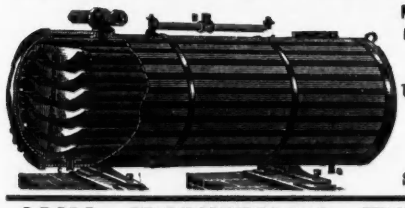

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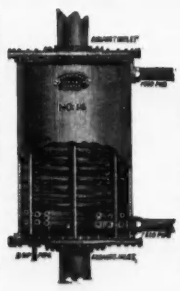

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13 "	13⅛ "
15¼ "	17 "
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21 "	25½ "
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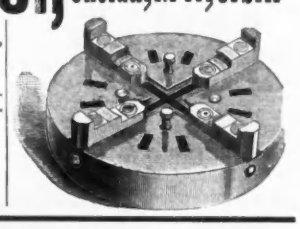

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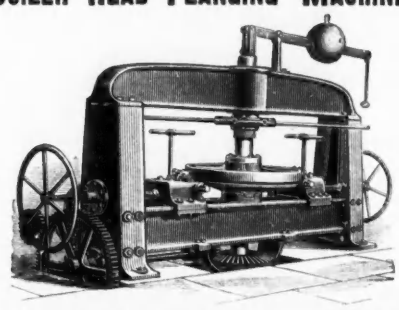

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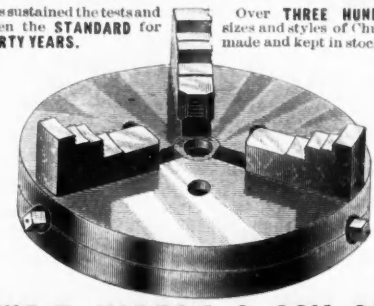

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THIS CAN BE USED AS A UNIVERSAL INDEPENDENT OR ECCENTRIC CHUCK WITH BETTER SATISFACTION THAN MANY OF THE COMBINATION CHUCKS NOW IN THE MARKET

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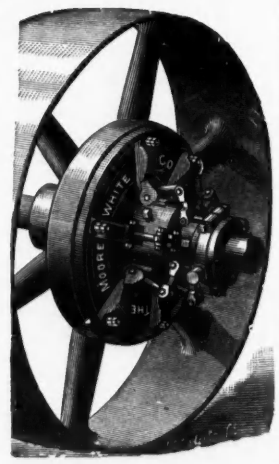

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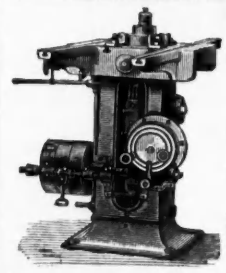

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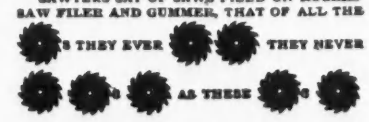

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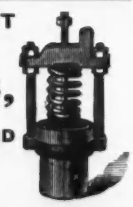

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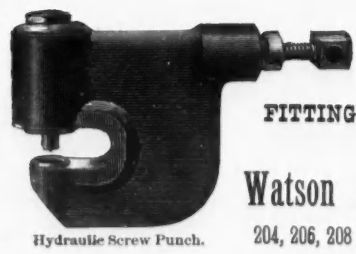

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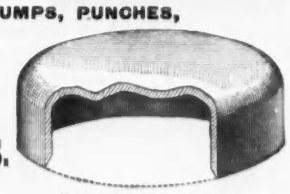

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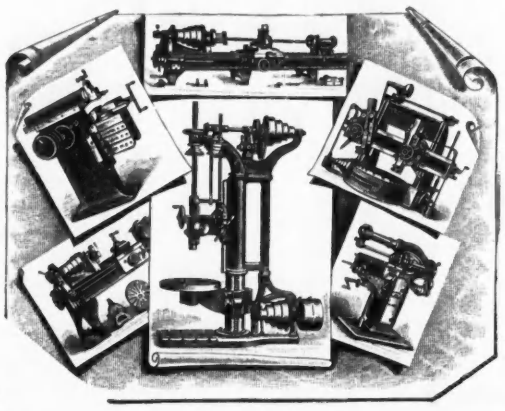

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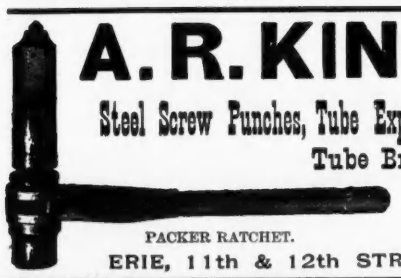

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COMBINATION GAUGE. No. 58
Surface and Scratch Gauge Combined.
The cut shows this used as a Surface Gauge. Can be set with greatest accuracy. Being strong, not liable to spring or change from its position. **Price, per pair.....$2.00**
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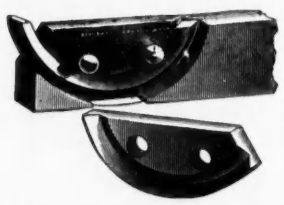

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BUILD and REPAIR YOUR MACHINERY BY USING
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Manufactured by
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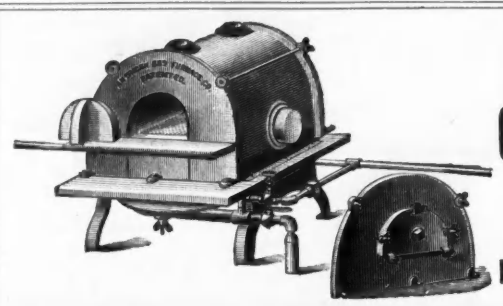

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From 16″ to 36″ wide by any length.
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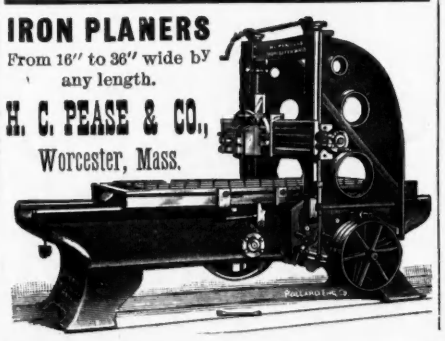
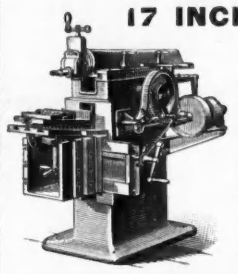


Patent Friction Shaper.

17 INCH STROKE.



Double racks allowing shaft 2½ to pass through base. Adjustable table for taper work, swivel jaw vise, feed adjustable while running, driven by hardened steel worm in phosphor bronze wheel; smooth running, powerful, durable.

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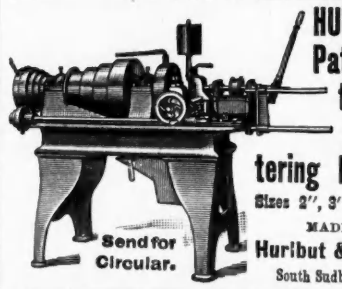

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Sizes 2″, 3″, 4″, 5″, 6″.
MADE BY
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Send for Circular.

ALUMINUM $2 PER POUND.

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Commercially pure aluminum at
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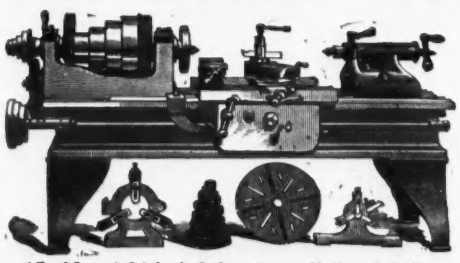

17, 19 and 21-inch Swing, Large Hollow Spindle.
Taper Attachment, Automatic Stop, Compound Rest, Lead Screw, under front V. All feeds reversed in apron.
Extra heavy, Convenient, and easily handled.

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24, 27, 32 and 38-inch Swing, Cabinet Legs.

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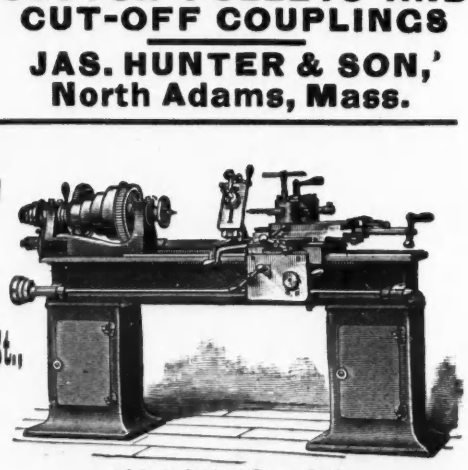
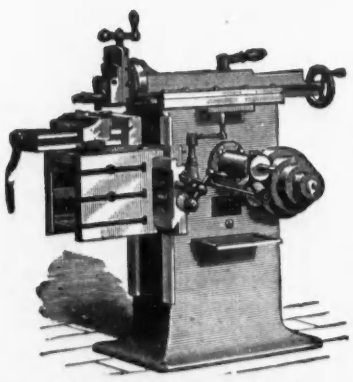


18-inch Cabinet Turret Lathe.
Taper Attachment, Automatic Feed, Lever and Screw Movement, most complete brass lathe on the market.

COMPLETE MACHINE SHOP EQUIPMENTS A SPECIALTY.



ENGINE LATHES
TURRET LATHES
IRON PLANERS
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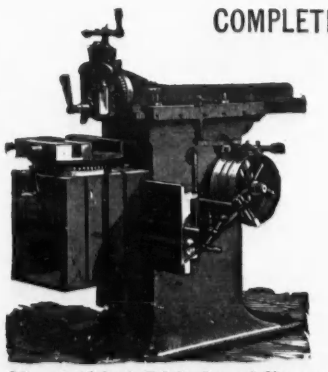
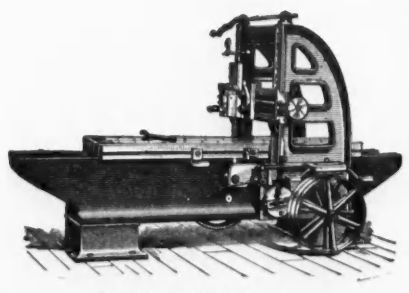


15 and 20-inch Crank Shaper.
Stroke changed and adjusted while running. Stroke at all times positive.
Invariably plane to a line.
Detachable Tables.

20, 26 and 32-inch Triple Geared Shapers.
Stroke changed while machine is running. Shaft can be passed through head of machine and key seat cut in same to any length. Extra heavy vises. Tables slotted on all sides.



24, 32 and 36-inch Planers.
Extra deep beds and tables. Powerfully geared. Plenty of Metal and designed for extra heavy duty. All Feeds and Shipper operated from both sides.
Improved Device for holding Planer Bolts.

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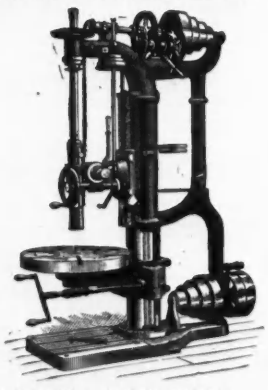

25, 28, 32 and 40-inch Drills.
Automatic stop to feed. Quick return on right side. Table operated from front. Large cones and long belts.

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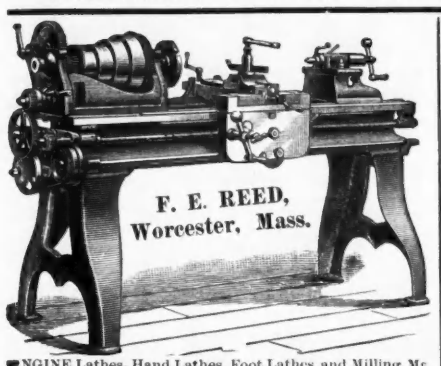
Manufacturers of Morse Patent Straight-Lip Increase Twist Drills.

Solid and Shell Reamers, Beach's Patent Self-Centering Chuck, Bit Stock Drills.
DRILL GRINDING MACHINES, MILLING CUTTERS AND SPECIAL TOOLS TO ORDER.



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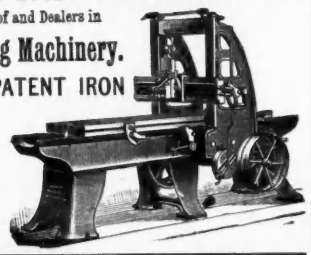

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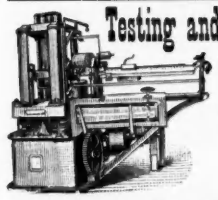

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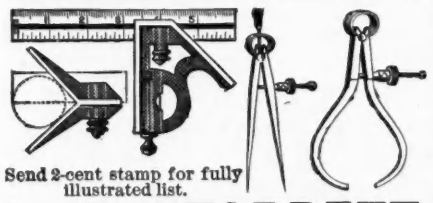

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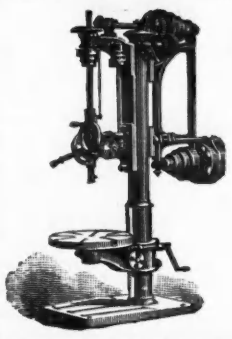

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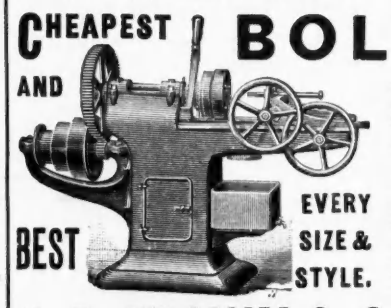

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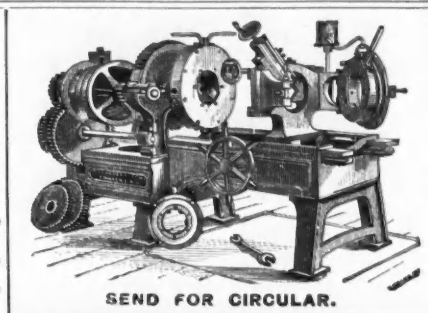

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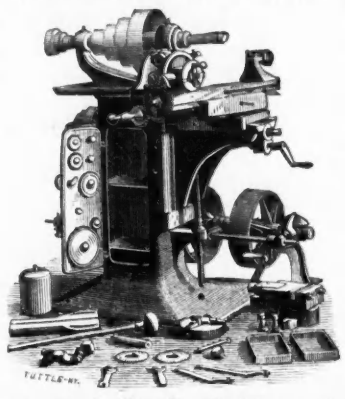

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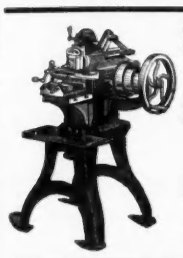

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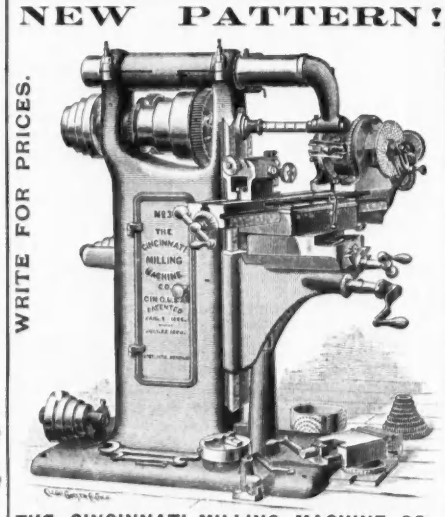

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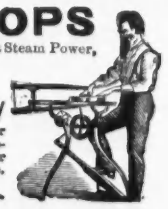

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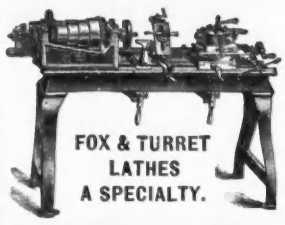

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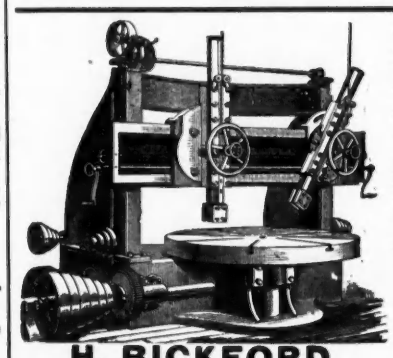

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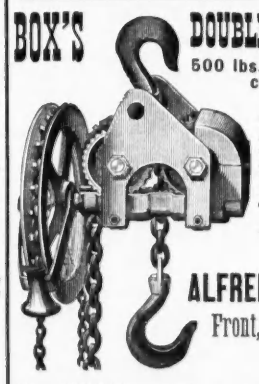

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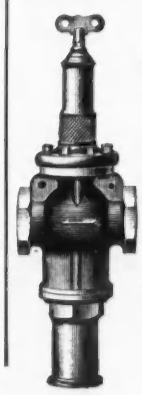

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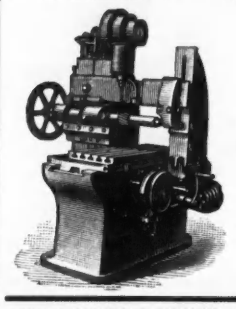

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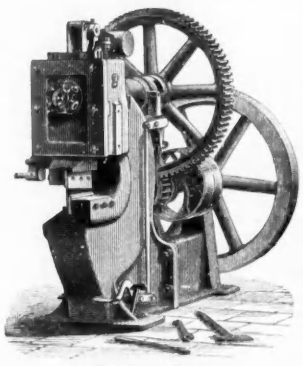

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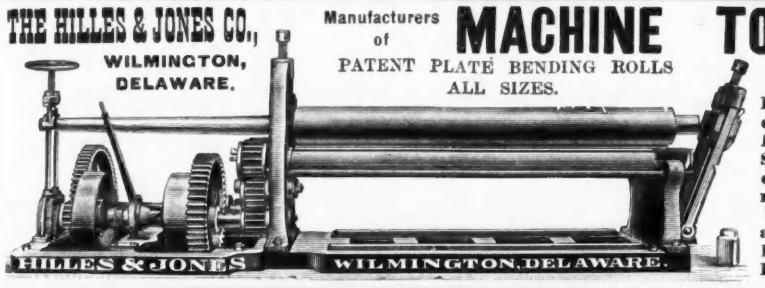

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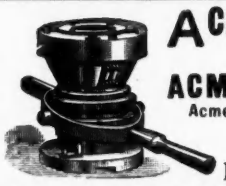

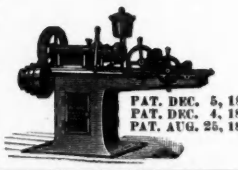

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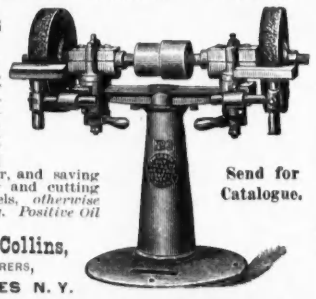

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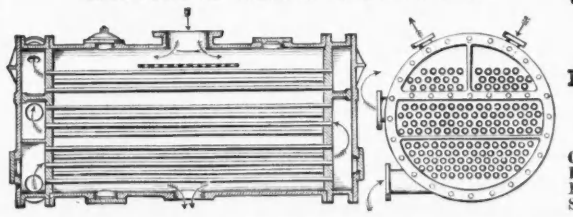

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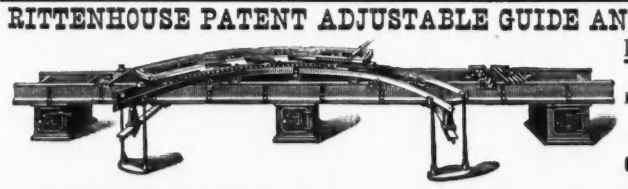

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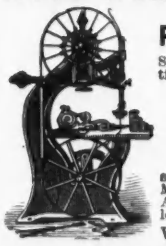

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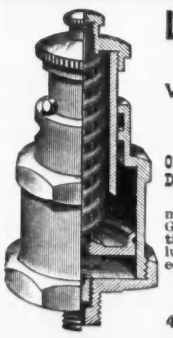

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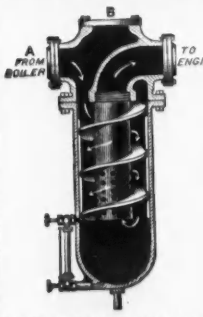

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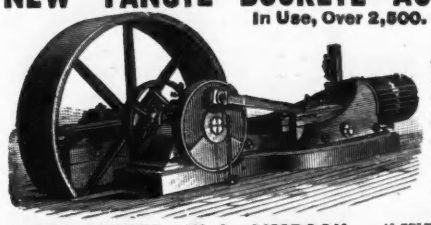

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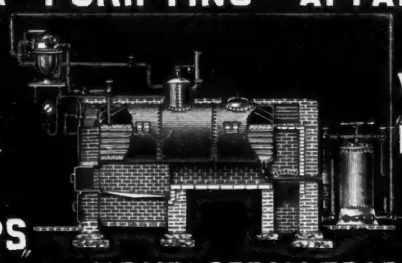

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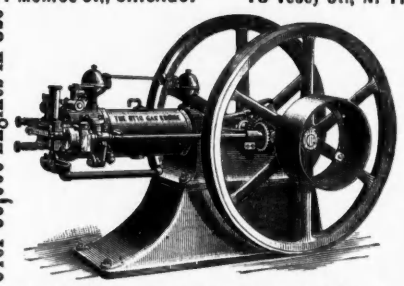

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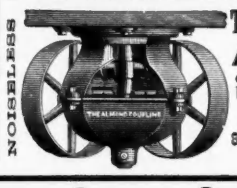

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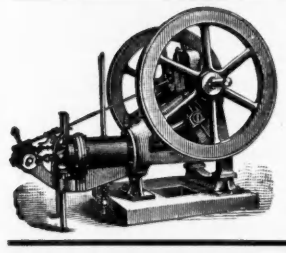

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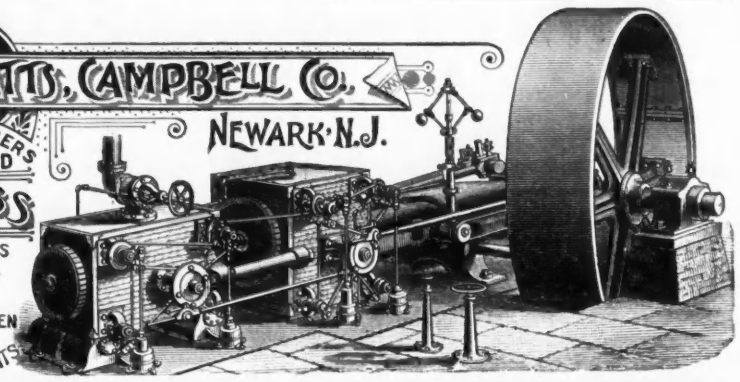

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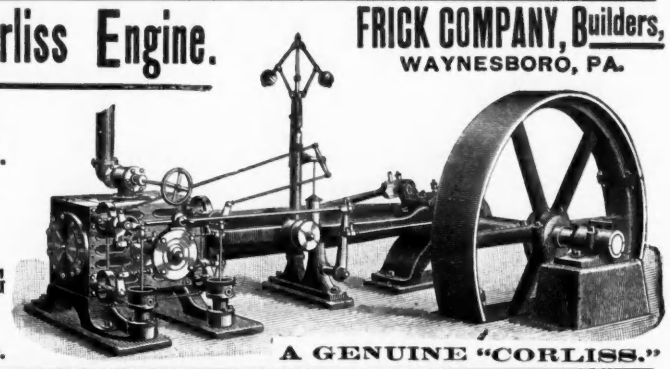

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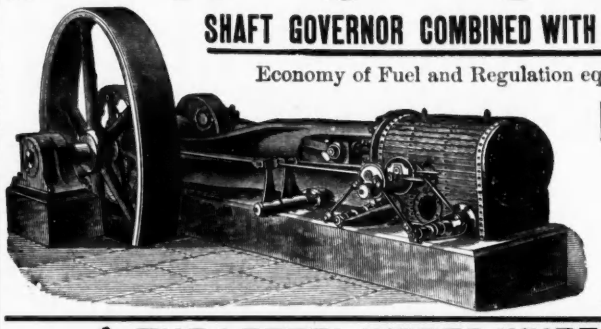

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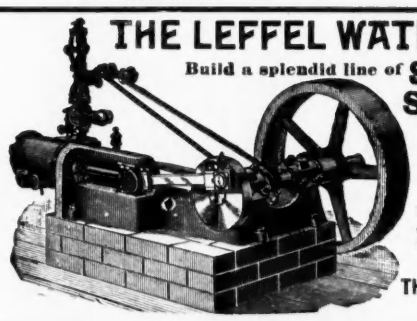

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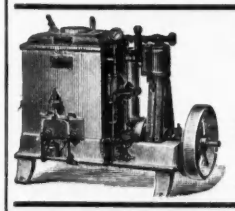

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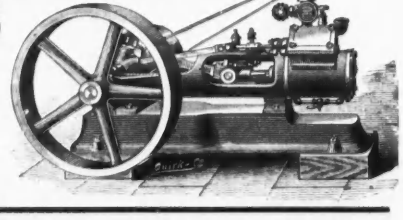

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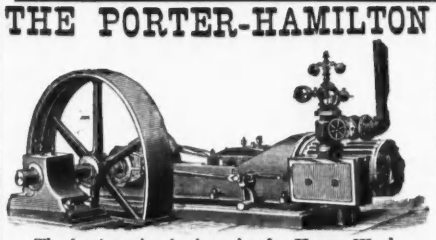

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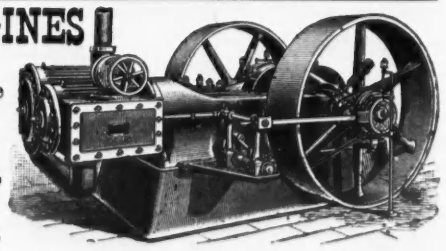

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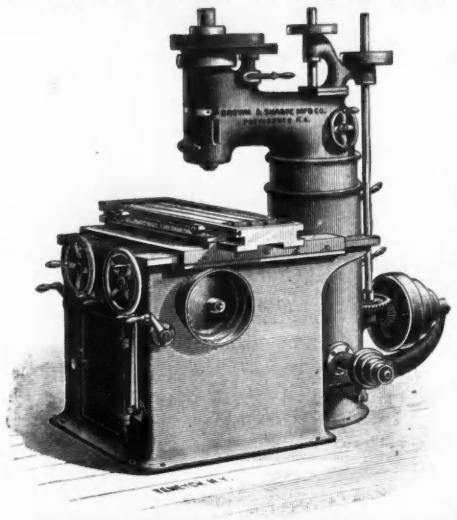

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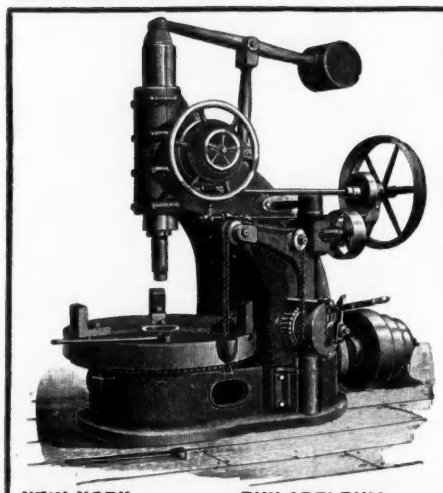

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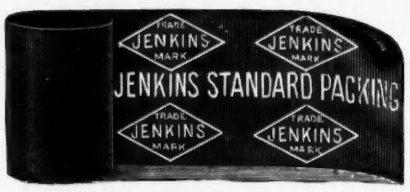

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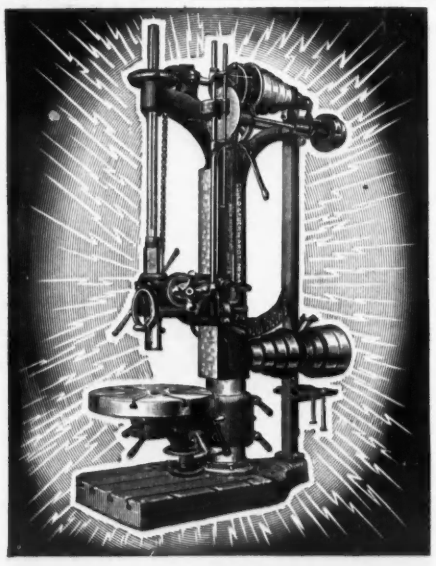

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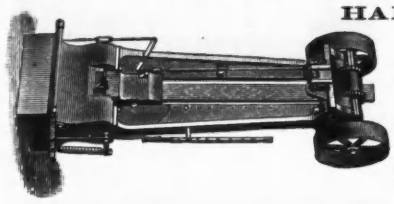

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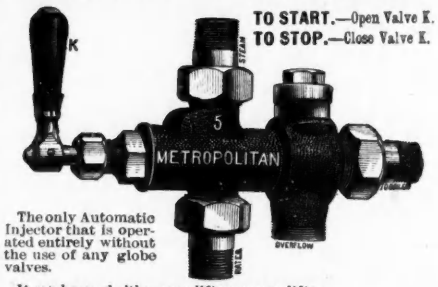

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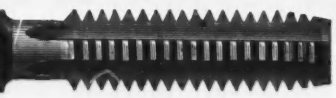

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